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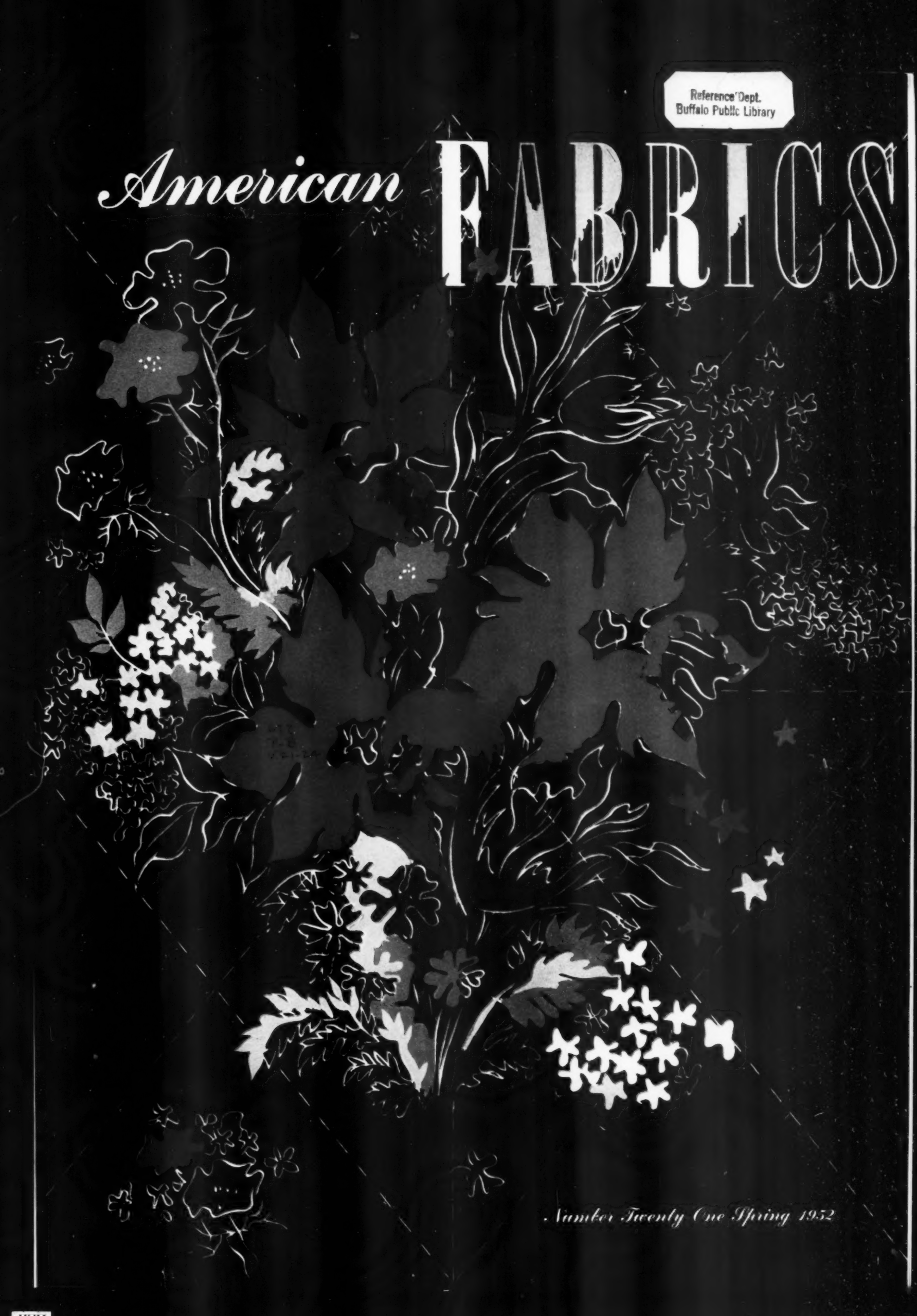

Number Twenty One Spring 1952

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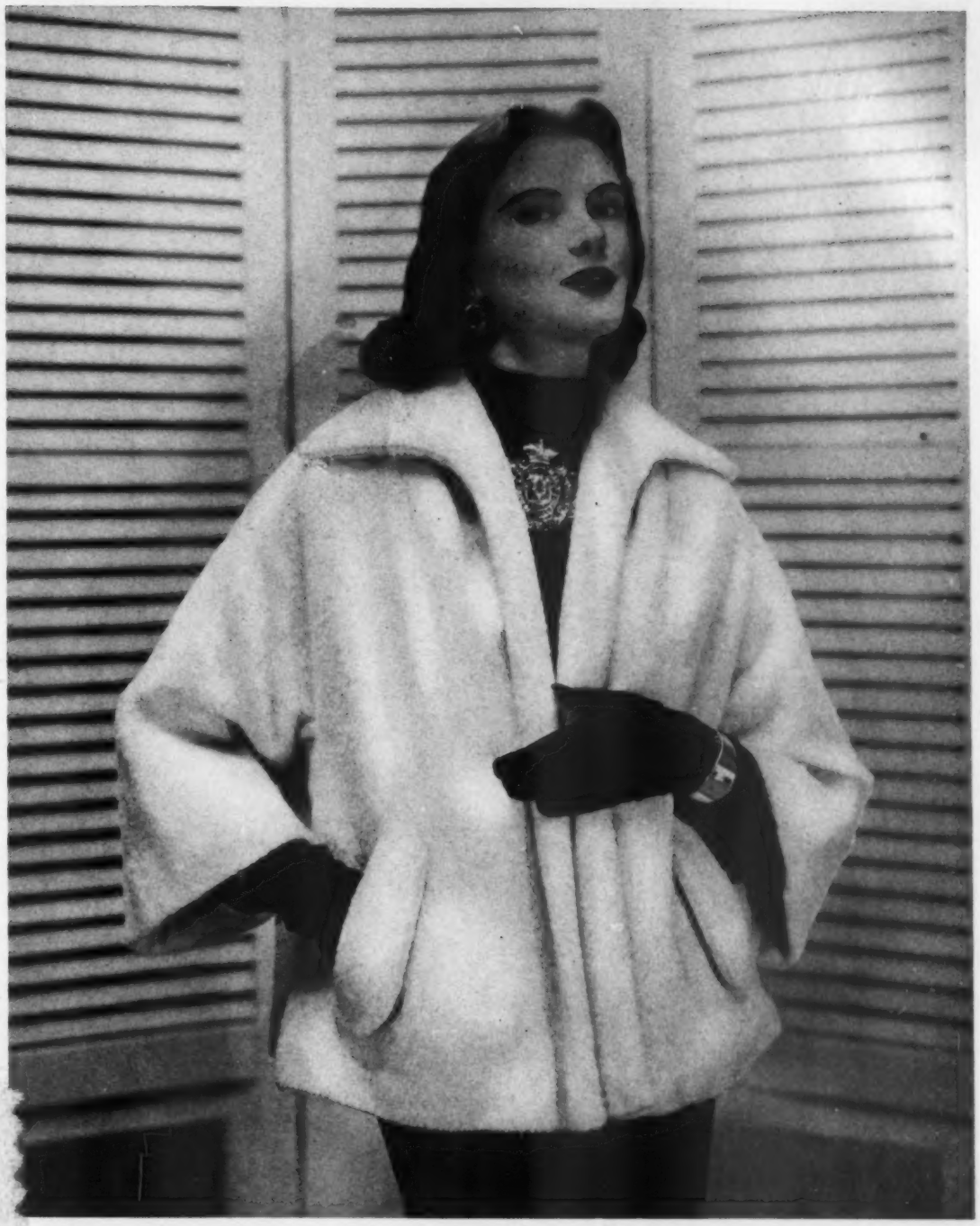

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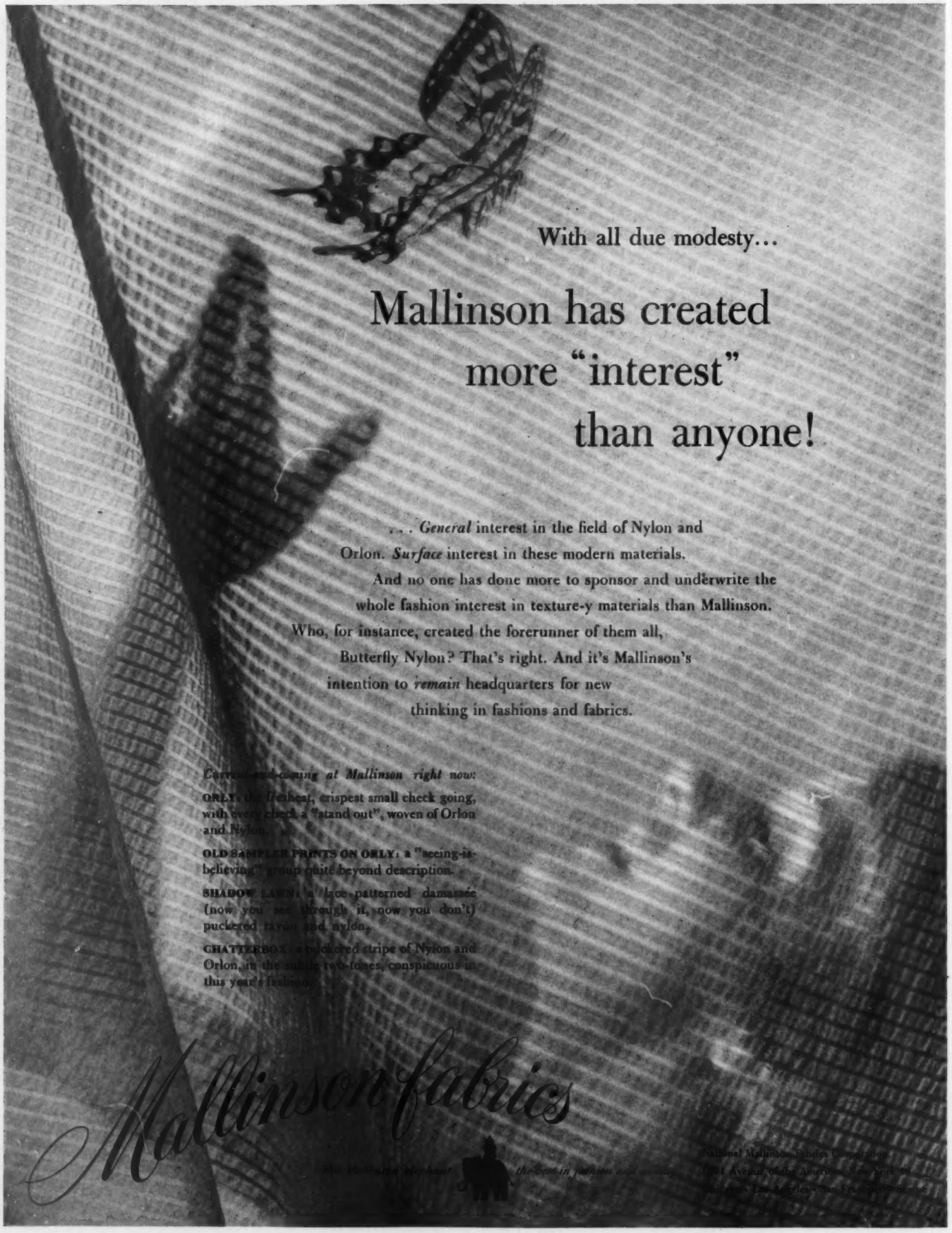
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Quiz for the readers of American Fabrics

Q: Can you name the new, extra-strong, rayon-and-acrilan flannel that has been called "the most important suit and coating development in the past decade"?

A: Flannelan by Cohama* (50% rayon, 50% acrilan) has the soft, warm hand of wool—yet it is mothproof, wrinkle-resistant, can't sag, holds pleats permanently. 2-ply warp and filling. 44/45 inches wide.

Q: What new advance has been made in the construction of jersey to keep it permanently pleated even after washing?

A: Cohama makes Orlane jersey of 15% virgin wool (for softness of texture, weightless warmth) plus 85% orlon.† This orlon content produces a jersey that can be permanently pleated, washed or dry-cleaned. 52/54 inches wide.

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Q: Who pioneered the washable, quick-drying nylon tricot prints that revolutionized the blouse, dress, lingerie, and negligee industries?

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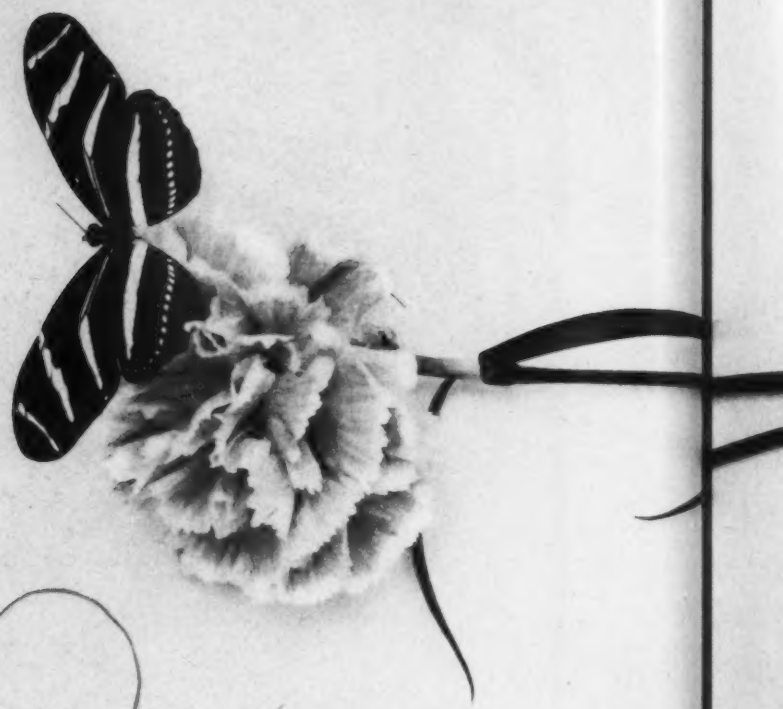

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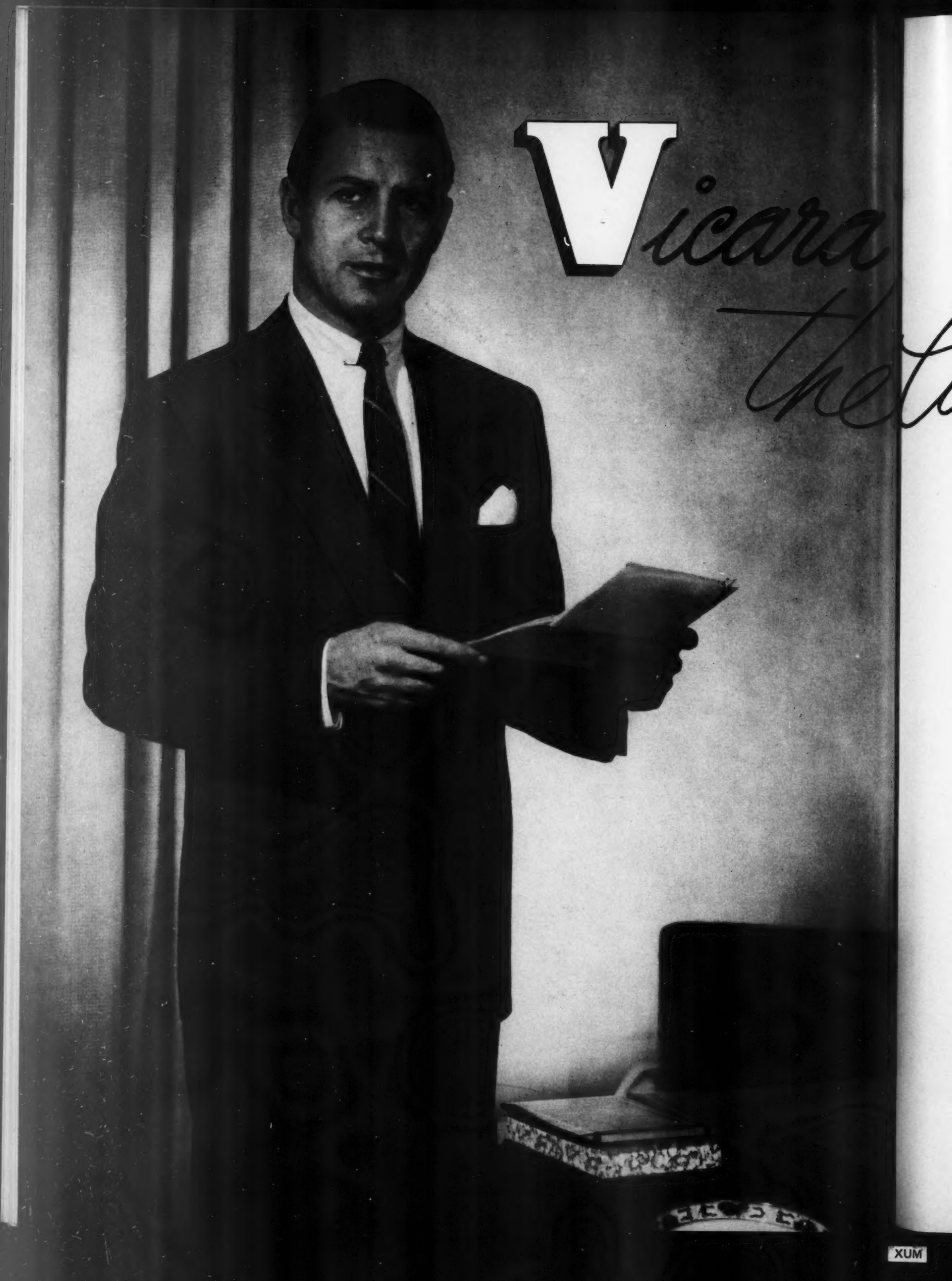
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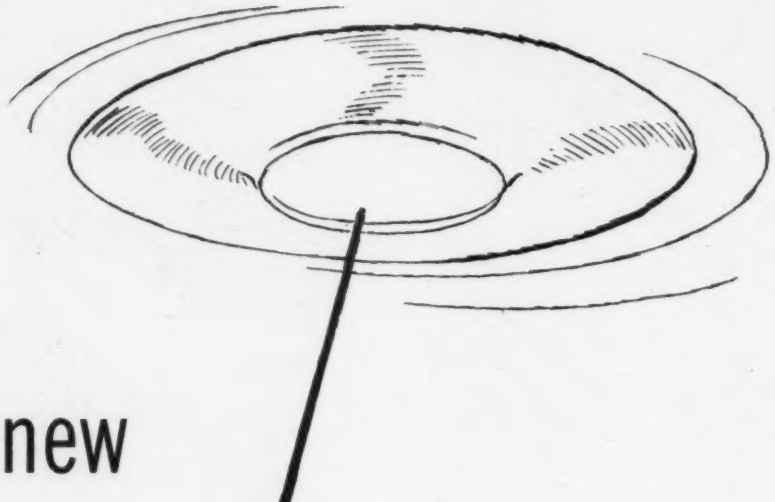

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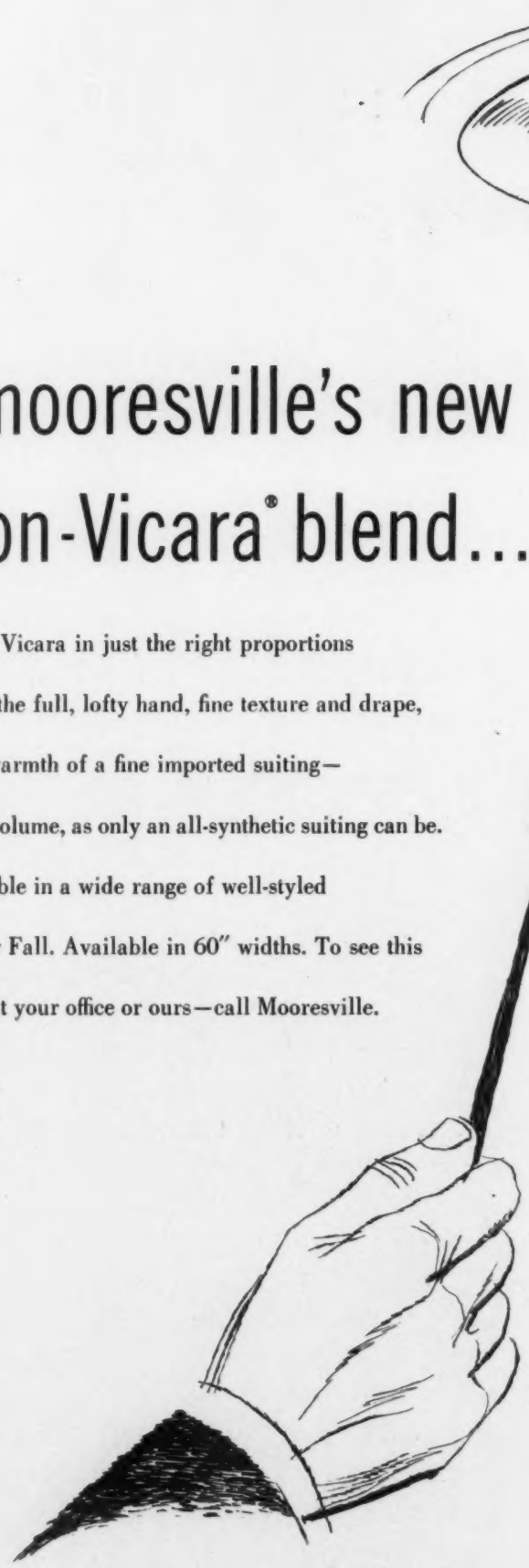

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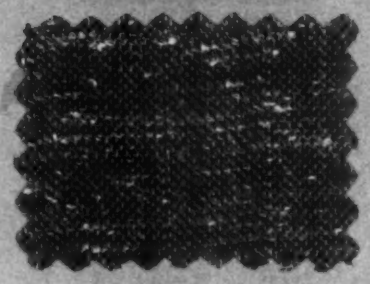

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xclusive in **AMER-MILL** *fabrics*

TOTARN *adds a stabilized crepe texture, richer hand to* **ACETATE**
another exciting Amer-Mill exclusive

TOTARN *brings a permanent, silken lustre to . . . . .* **COTTON**
another exciting Amer-Mill exclusive

TOTARN *lends body and weight to the softness of . . . . .* **SILK**
another exciting Amer-Mill exclusive

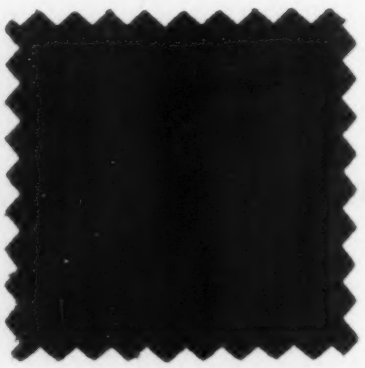
FABRICS

XUM

the creative genius that produced ***totarn****...*
that pioneered in ***nylon fabrics****...that has*
developed so many ***exclusive blends*** *with*
natural and man-made fibers, is

AMERICAN SILK MILLS

America's largest weaver of fine silks



TUSSUPREME . . . *silk honan suitings*

Exclusive blend of Tussah—wild silk and cultivated silk. Rich to extreme, lustrous; preferred by the nation's finest designers of men's suits, women's suits and coats . . . for its tailoring perfection, amazing resilience and enduring beauty.

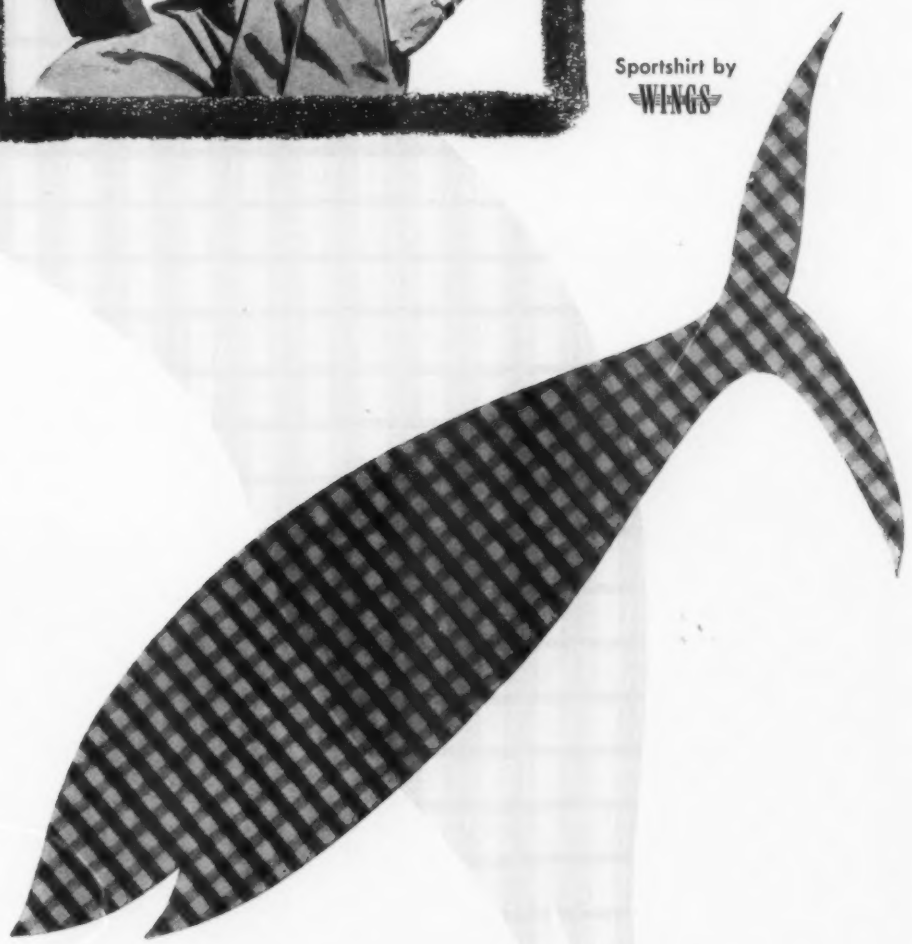
SANTIR . . . . . *silk shantung twill*

A superb pure-dye pure silk of great elegance that glows with the deep luster of polished precious metal. Sleek of surface yet textured with the shantung nubs so important in today's fashion picture.

AMERICAN SILK MILLS, INC. *creators of exciting* **AMER-MILL FABRICS**

1400 BROADWAY, NEW YORK 18, N. Y.

Sportshirt by
WINGS



BEAUNIT CHECKS

are crisp, fresh, irresistible, in men's and women's apparel. Bait your line with these outstanding fabrics of acetate and **BEMBERG®** rayon! They wash and dry in a jiffy with no shrinkage worries!

Beaunit Mills, Inc., 450 Seventh Ave., N. Y. 1

SEAL OF MERIT
BEAUNIT FABRICS

FOR A BUSY LINE

He draws a linn

...to keehe

Charting the nooks and crannies of a wrinkle tells Du Pont research men how well a fabric resists wrinkles and how easily it sheds them. Immediately after being crushed, the fabric is placed in this wrinkle tester and a sensitive probe measures every crease. Then the fabric is hung overnight, and a second test records its recovery.

Du Pont fibers are plannefor

on wrinkles
hem out of your clothes!

Helping your clothes keep that "just pressed" look is part of the job of Du Pont fiber research

Clothes that get rumpled don't have to end up with wrinkles! For out of fiber research are coming fabrics that are harder to wrinkle... fabrics that easily shed many of the wrinkles that ordinarily get into them.

Du Pont scientists developed this wrinkle tester to measure accurately every ridge and valley in a wrinkled fabric. By comparing "wrinkle charts" of various types of fabrics, they can see how fibers perform to keep you looking your best.

Such tests help Du Pont *build* properties into fibers that help fabrics resist wrinkling . . . keep their shape better. These tests are part of the planning that gives man-made fibers so many desirable qualities —in combinations nature doesn't supply.

Du Pont makes five such fibers: *Nylon, Rayon, Acetate, Orlon* acrylic fiber, Dacron* polyester fiber.* Each is man-made, man-planned to do certain fabric jobs best. Each gives you "better things for better living . . . through chemistry."

Textile Fibers Department, E. I. du Pont de Nemours & Co. (Inc.), Wilmington, Delaware. Du Pont makes only the fibers—not the fibers or finished products shown.

*DU PONT TRADE MARKS

DU PONT
REG. U. S. PAT. OFF.

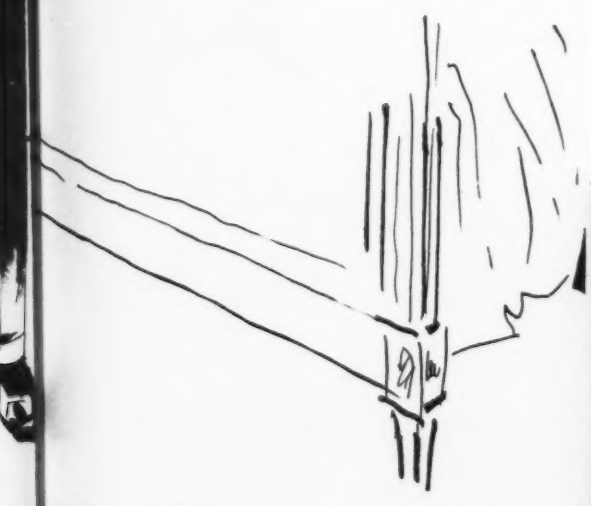
150th Anniversary

Better Things for Better Living
. . . through Chemistry

You know nylon best for its strength, long-wear, easy-care qualities. But Du Pont chemists have built many more properties into this fiber. For instance, a nylon sweater will not shrink or stretch out of shape after washing. **NYLON**

Most all-round useful fiber created by man is probably rayon. This versatile fiber makes durable suit linings . . . its beauty and variety of textures are found in upholstery materials, draperies, dress fabrics. **RAYON**

New "Dacron" fiber from Du Pont has outstanding wrinkle resistance, wet or dry. A blouse made of "Dacron" washes easily, dries quickly, keeps its fresh look, needs little or no ironing. **"DACRON"**



for better living

The luxury fiber, Du Pont acetate, makes beautiful dresses that are easy on the budget. Today's fashion news spotlights how leading designers use acetate rayon for drapability and texture interest. **ACETATE**

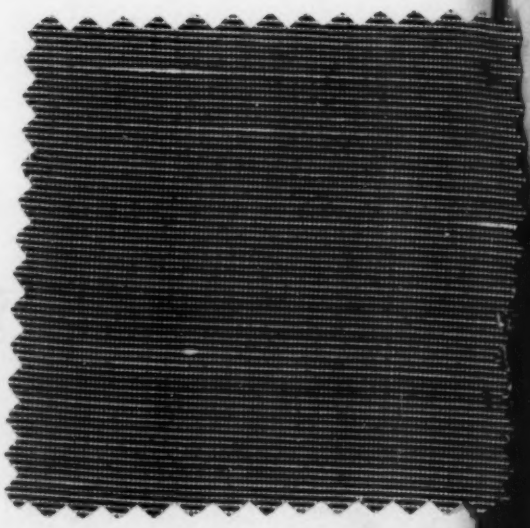
You've heard about Du Pont "Orlon" as the fiber that stands sun and weather. Its other fine properties make socks, for instance, that are delightfully soft and warm, yet won't stretch or shrink. **"ORLON"**

XUM

a designer's eye-view of the birth wo

These are what I've been waiting for

The FIRST RAYON BENGALINES -- just in time for Fall
-- Bengaline's going to be terrifically important.
Really exciting -- inspiration for my designing ...



NOTE FOR MAKERS:

Specially good for right now -- they'll add excitement to fashions without increasing costs. Will need no frills or extras -- these fabrics can make the fashions! WHAT'S MORE -- ANYONE CAN AFFORD IT!

#17642

Classic Bengaline with a modern slub rib.
Different! Wonderful hand and drape too!

BENGAL-INE
a tiger for wear, I bet

Burlington

wo new bengalines

#17421-

A two-tone rib in Bengaline. Very subtle -- Very clear -- Rich -- Smooth -- Crisp.

#4-7100 I love you!

MEMO

makes a wonderful suit

A crisp, jut-back suit first, I think, like this. It's 13½ oz. -- perfect year-round suiting weight.

— or a dress, maybe
or a coat?
lined. lightweight topper?
or middy jacket
and skirt?

Burlington

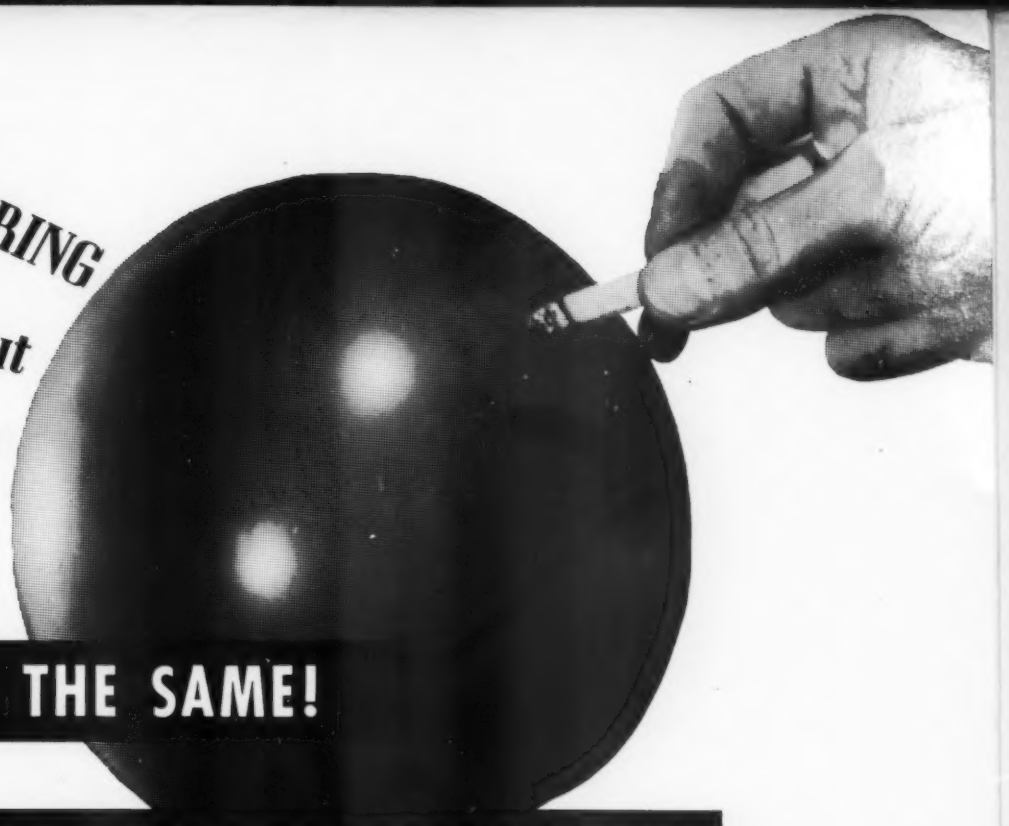
Burlington Mills

1407 Broadway, New York 18

WOMEN'S COAT, SUIT, SPORTSWEAR FABRICS DIV.

something's in . . .
the wind for fall . . .
SURFACE INTEREST
in fabrics
Lankenau COMPANY, INC. 1450 BROADWAY, NEW YORK, N. Y.

Let's Start PUNCTURING some ideas about ORLON JERSEY!



ALL ORLON JERSEY IS NOT THE SAME!

ONLY ONE MILL PRODUCED OVER 500,000 YARDS OF ORLON JERSEY IN 1951. THAT MILL WAS ALAMAC

See how Alamac's longer **ORLON** *know-how is translated into a fabric with a fine, luxurious hand.*

ALAMAC THALSPUN 2 PLY ORLON JERSEY IS BETTER because this virgin fabric is spun on the silk system. (compare with usual 1 ply fabrics).

ALAMAC THALSPUN 2 PLY ORLON JERSEY IS BETTER because it weighs over 7 oz. (compare with ordinary 6 to 6½ oz. fabrics).

ALAMAC THALSPUN 2 PLY ORLON JERSEY IS BETTER because it retains its shape after washing. (always looks fresh—won't stretch or shrink).

ALAMAC THALSPUN 2 PLY ORLON JERSEY IS BETTER because it's soft and warm as cashmere without weight.

that's why leading stores all over the U. S. prefer nationally advertised

THALSPUN

TRADE MARK REG. APP.

made of ORLON* Dupont's new acrylic yarn plus a small percent of fine worsted.

*Trade Mark Reg.

alamac knitting mills, inc.

350 FIFTH AVENUE NEW YORK 1, N. Y.

West Coast Representative: Irwin Mayer Associated, 819 Santee Street, Los Angeles 14 • VAn Dyke 8267

XUM

REQUIRED
SUBJECTS
IN THE
FINISHING
of
FINE COTTONS

BLEACHING
DYEING
PRINTING

® BELLMANIZED
(Starchless finish)
® SANFORIZED
® TEBILIZED
(for tested crease
resistance)
® HEBERLEIN PROCESS
TECHNICAL and
FASHION RESEARCH

Bellman Brook BLEACHERY COMPANY
(8 Miles from Times Square) FAIRVIEW. N.J.

American Fabrics presents

the

KEY

to

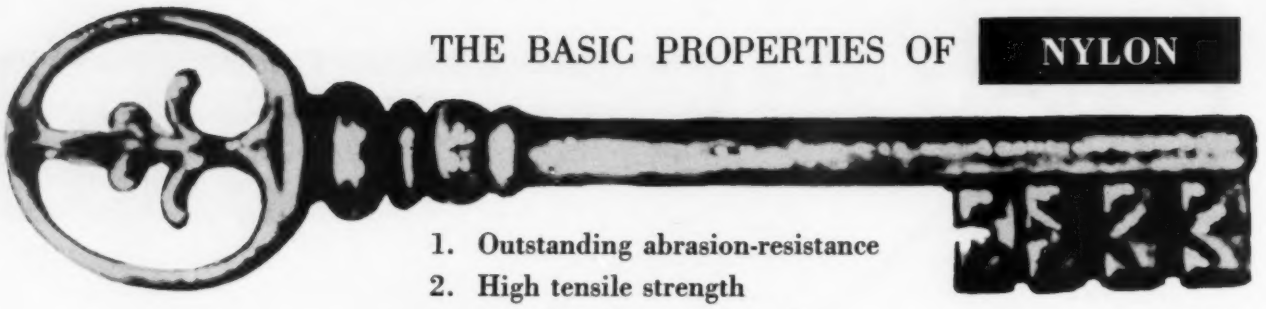
TODAY'S NEW COMBINATIONS

OF THREE GREAT FIBERS . . .

NYLON DACRON* ORLON**

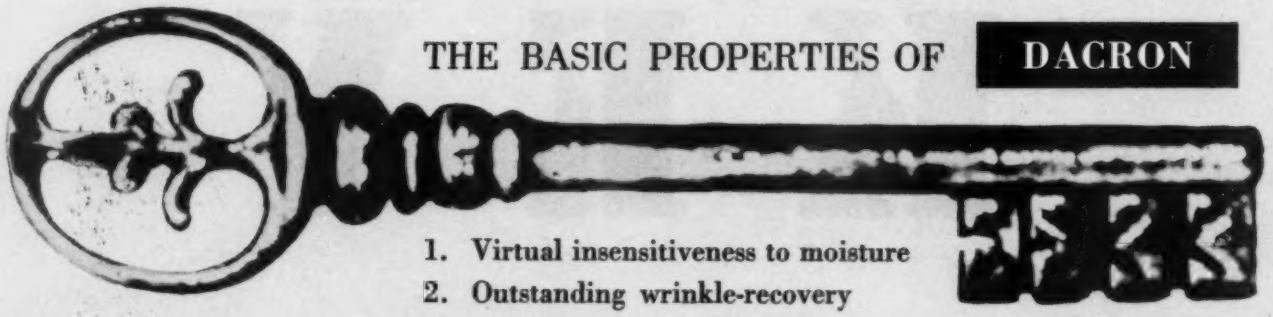
* *Du Pont polyester fiber*

** *Du Pont acrylic fiber*



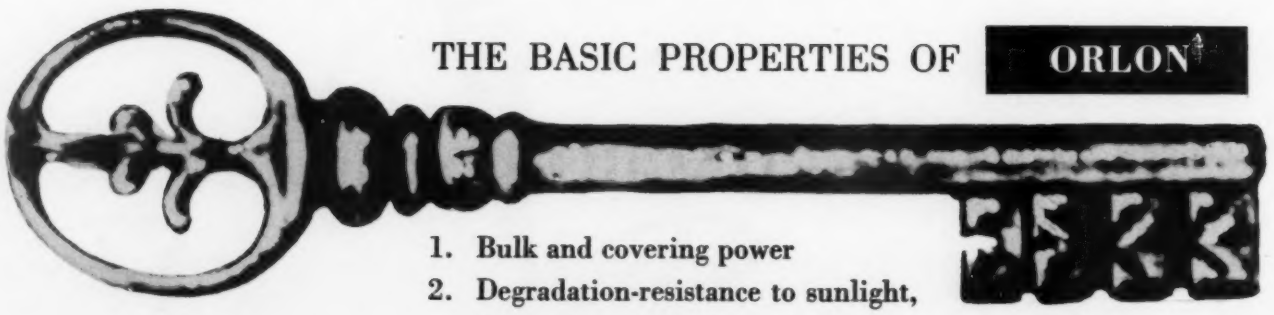
THE BASIC PROPERTIES OF NYLON

1. Outstanding abrasion-resistance
2. High tensile strength
3. Non-shrinkage or stretching
4. Flame-resistance



THE BASIC PROPERTIES OF DACRON

1. Virtual insensitiveness to moisture
2. Outstanding wrinkle-recovery
3. Exceptional crease-retention
4. High-strength, long wear



THE BASIC PROPERTIES OF ORLON†

1. Bulk and covering power
2. Degradation-resistance to sunlight, heat, atmospheric gases, perspiration
3. Luxurious, warm, dry hand
4. Strength with light weight

ENGINEERING FABRIC TO AN OBJECTIVE

An explicit key to understanding the new fibers.

A FABRIC DESIGNER must be part artist, part engineer. He considers first how a fabric is to be used; next, what it is supposed to do. When he knows these two answers, he selects the fiber or a combination of fibers that will serve the purpose, and then proceeds to considerations of yarn, twist, etc., with the assurance that the best possible fabric will be developed.

Until a few years ago fabric designers were restricted by the limitations of the natural fibers, but with the recent development and manufacture of man-made fibers such as nylon, Orlon acrylic fiber, and Dacron polyester fiber, the horizons of fabric design have been greatly expanded. Because these are engineered fibers, they can be endowed at their birth with many unique functional properties that can be translated by the genius of designers into fabrics of hitherto unknown beauty, durability and economy.

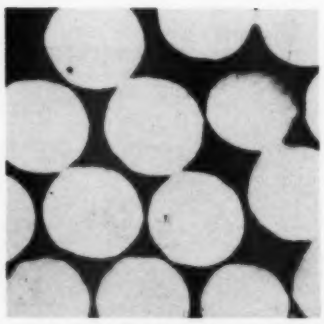
Basically, many of the man-made fibers have the same characteristics, but in addition they each have their own outstanding properties, and when properly used and made into fabrics they contribute much to assure ease of living and ease of care. Included among the unusual qualities of the engineered fibers are excellent drapability, strength, light weight and refusal to shrink or stetch. They resist degradation from moths, mildew, sunlight, heat, perspiration and atmospheric gases. Man-made fibers in fabrics are able to combine high style with low maintenance costs. Many of these fabrics can be hand washed with ordinary soap or detergents. They dry rapidly and in most cases need little or no ironing to retain their original beauty.

Like constructional engineering in steel, the fabric engineer chooses his combination from a dozen fibers and, considering the exact end use desired, engineers his construction accordingly. He thus makes use of the individual property of each component in the most effective way.

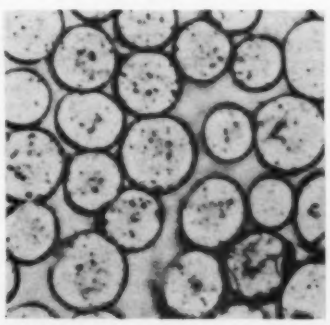
* * *

It is unlikely that any one fiber will ever be a universal fiber. The diverse requirements of the textile industry preclude such a possibility. However, the advent of the versatile man-made fibers, each with its specific properties, now makes available an entire new range of fabric development for the designer. By careful study and application of these fibers, he can now produce fabrics of unprecedented beauty, economy and durability — fabrics designed from their origin for a definite purpose.

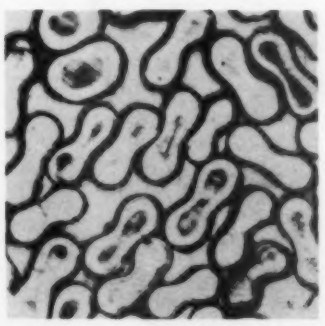
(please turn)



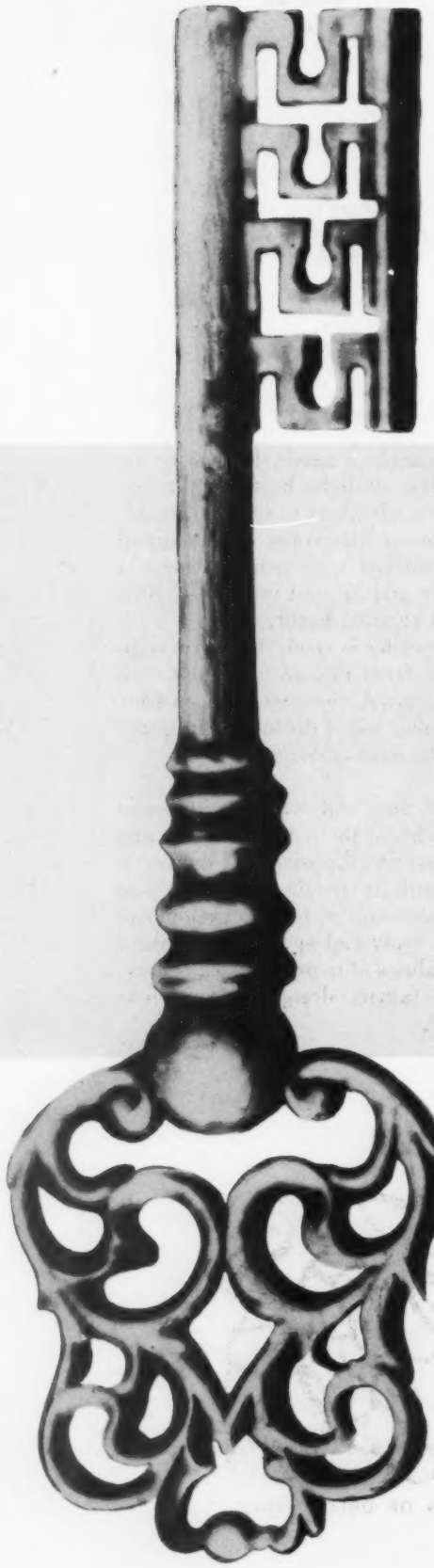
SECTION OF NYLON FIBER



SECTION OF DACRON FIBER



SECTION OF ORLON FIBER



NYLON

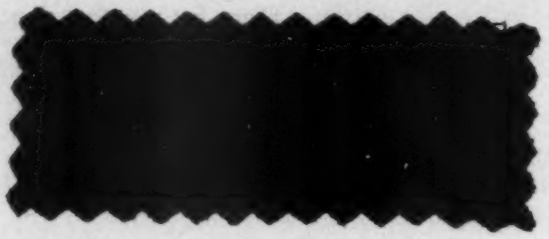
Fabrics made entirely of nylon get full benefit from this fiber's unusual properties — strength with light weight, resistance to wear and tear, shape-retention and easy care. Nylon, the first of the truly chemically man-made fibers, is versatile and its many desirable properties provide new and better fabrics for home decoration, industrial purposes and for apparel suitable to all ages and seasons.

ALL NYLON

All nylon frieze home furnishing fabric, unsurpassed in strength and strain-resistance. One strand of the pile thread, when removed from the fabric, is sufficiently strong to support a chair weighing 75 pounds. By Collins & Aikman.

DACRON

When used alone in fabric construction, Dacron offers high wrinkle-resistance under wet as well as dry conditions, ability to retain a sharp crease almost indefinitely, long-wear life, washability and easy spot removal, together with good strength and abrasion-resistance. Dacron, because of its resilience and aesthetic appeal, can be used in a wide range of applications including men's and women's apparel.

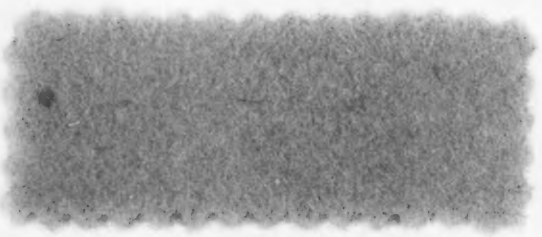


ALL DACRON

Tropical suiting by Princeton Worsted. Holds crease even after a rainstorm. Wrinkle-, moth-, mildew-, perspiration- and abrasion-resistant. Most spots can be taken out with soap and water.

ORLON

Outstanding among the characteristics to be found in properly made fabrics of 100% Orlon are the greatly desired values of hand and feel, comfort and durability. Orlon enhances fabrics with its characteristic warm, dry feel, bulk with light weight, resistance to damage from moths, sunlight or heat. In this way Orlon offers maximum convenience and comfort.



ALL ORLON

Zephyr fleece by Princeton Knitting Mills. Washable by hand or machine without change of appearance or shrinkage. Moth and mildew proof. Non-flammable.

NYLON

NYLON-COTTON

When properly combined with cotton, nylon adds a strength which permits the development of unusually fine textures which would not be possible with cotton fibers alone. In addition, the use of nylon enhances the fabric appearance and adds wrinkle-resistance and coolness through light weight. This combination allows the weaving of extremely sheer fabrics that are thoroughly serviceable.

NYLON-ORLON

Fabrics made by combining nylon and Orlon acrylic fiber unite the strength and abrasion-resistance of nylon with the luxurious hand and excellent covering power of Orlon to achieve many unusual and attractive effects. Since nylon and Orlon have different dyeing characteristics, it is possible to obtain unique fabric patterns with this combination of fibers. Similar attributes of nylon and Orlon, such as wrinkle-resistance, crease-retention and ease of care are increased when these fibers are combined.

NYLON-WOOL

The combination of nylon and wool will produce a lighter weight fabric with longer wearability, and yet one which retains the hand and fine characteristics of natural wool. Fabrics of this combination will have good resilience, shape-retention and wrinkle-recovery.

NYLON-RAYON

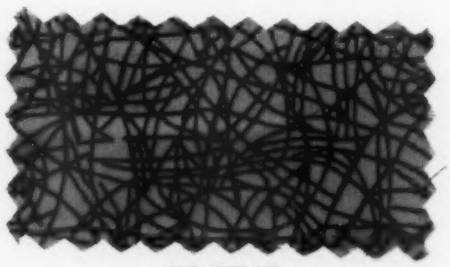
In a nylon-rayon combination the rayon gives hand and drape while the nylon gives increased wrinkle-resistance and long wearing qualities. It makes possible a fine quality fabric in extremely light weight.

NYLON-ACETATE

Both nylon and acetate have many properties which become even more effective when used in combination. The acetate gives luxurious hand; the nylon gives light weight and easier care. It improves wear, giving lasting freshness.

NYLON-SILK

In this combination the silk improves the hand of the fabric; the nylon improves the stability and functional qualities.

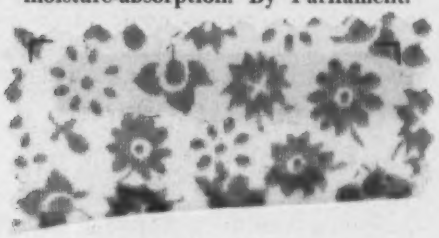


ALL NYLON

Print, cool and sheer, organza-like, but durable. Ideal for traveling because it requires only a minimum of ironing. By Mallinson.

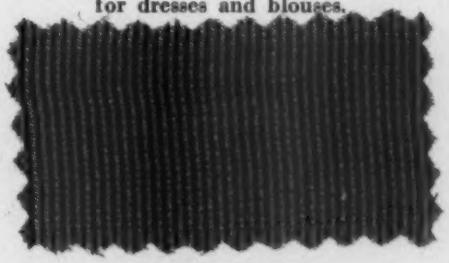
NYLON-COTTON

Nyl-Cott **sheer stripe. The nylon provides strength, silkiness and dirt-rejection; the cotton gives softness, moisture-absorption. By Parliament.**



ALL NYLON

William Winkler's warpknit nylon tricot printed sheer is of porous construction and drapes well. Its washability and ease of care recommend it for dresses and blouses.

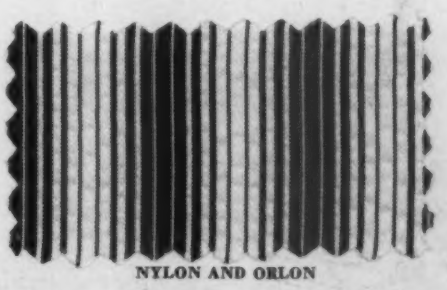


NYLON AND RAYON

Gloshan **cross-dyed tweed. Has a supple, full-bodied hand. Iridescence adds surface interest. By Cohama.**

ALL NYLON

Textured nylon tricot with interesting surface effect. By Philip Wick.



NYLON AND ORLON

A seersucker type fabric with novel ombré stripe effect which has the added virtues of Orlon and nylon. By Labtex Fabrics.

DACRON

DACRON-WOOL

Dacron polyester fiber brings outstanding wrinkle-resistance and crease-retention to combinations with wool, so that wet or dry the shape-retention of these fabrics is improved according to the proportions used. Added dimensional stability is obtained from this combination. The greater abrasion-resistance of Dacron makes for more longer wearing fabrics.

DACRON-NYLON

Nylon contributes strength and abrasion-resistance which, combining with the outstanding wrinkle-resistance and good tailoring properties of Dacron, provides a new combination of qualities in fabrics. These will be important in the apparel field. Every combination of these fibers offers stability, easy washability, quick drying and resistance to damage from mildew and insects.

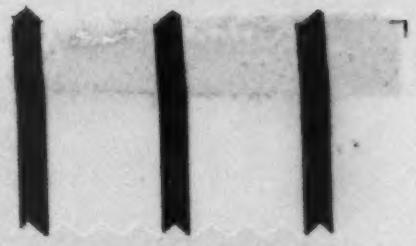
DACRON-RAYON

The addition of Dacron to a rayon fabric gives wrinkle-resistance, durability and drape-retention without the use of resins. At the same time the rayon combines with the Dacron to produce a fabric of improved beauty and versatility.

DACRON-ORLON

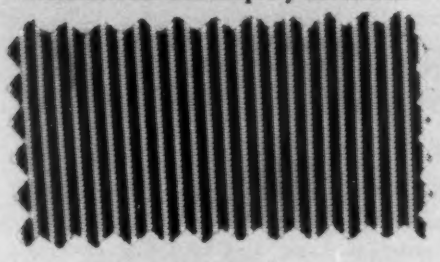
Orlon improves the hand of a fabric when combined with Dacron, giving better body comfort and wearability. Dacron gives the combination even greater wrinkle-resistance, especially under humid conditions.

Fiber Combinations . . . continued



ALL DACRON

A 40 denier printed sheer. Wrinkle-resistant, resists dirt and washes quickly; easy to care for because it remains fresh and crisp. By Cavalcade.

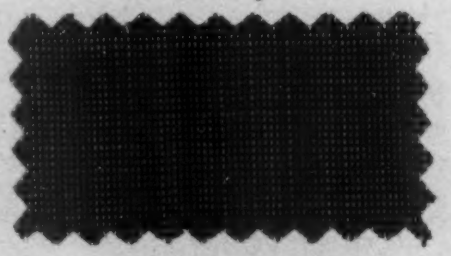


DACRON AND NYLON

Striped shirting by E. Richard Meinig has good washability, lies very flat and is mildew-resistant.

ALL DACRON

All filament Dacron shirting mesh fabric. Porous, dries quickly and does not require any ironing. By The Crown Corporation.



DACRON AND WORSTED

***Visa.* This light, fine, strong fabric does not change shape in humid weather. Retains pleats and has high recovery. By Milliken.**

DACRON AND RAYON

A steep twill by Burlington. The Dacron gives it greater resiliency and strength for its weight. It is crease-resistant and water-repellent.

ORLON

ORLON-WOOL

One of the outstanding characteristics of Orlon acrylic fiber is its bulk, so that when staple is effectively used in combination with wool, the resulting fabric is extremely soft, beautiful, light weight, yet warm. It also has a soft and beautiful hand. Fabrics of this combination have improved loft, crease-retention and wrinkle-recovery, and where there is a good proportion of Orlon they seldom need pressing.

ORLON-COTTON

In combination with cotton, Orlon adds strength with light weight, more wrinkle-resistance and ease of care. The outstanding ability of Orlon to resist sunlight plays an important role in the development of fabrics now being created from this combination.

ORLON-RAYON

To the versatility of rayon, Orlon in combination with it adds wrinkle-resistance and stability. With it, new and unusual surface effects and many and various dye effects, including cross dyes, are possible. Orlon also provides a dry, warm and luxurious hand.

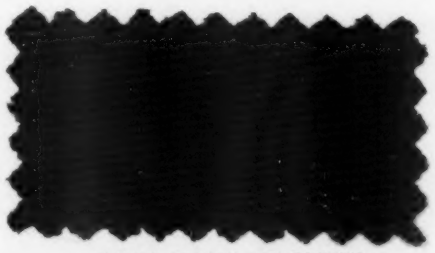
ORLON-NYLON (*see Nylon-Orlon*)

ORLON-ACETATE

When fibers of Orlon and acetate are combined, the resulting fabric is almost certain to be distinguished by a soft, luxurious feel, excellent drapability, shape-retention and easy launderability. This fabric dries rapidly and is easy to iron.

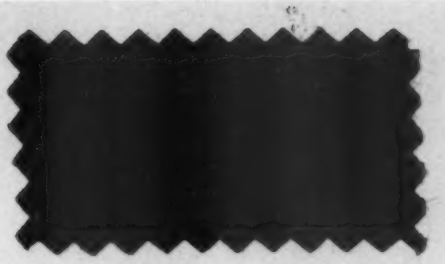
ORLON-SILK

Orlon and silk combined have outstanding hand. Together they give interesting cross dye and texture effects. The stability is excellent. The Orlon contributes easy care qualities while the combination contributes long wear and good appearance.



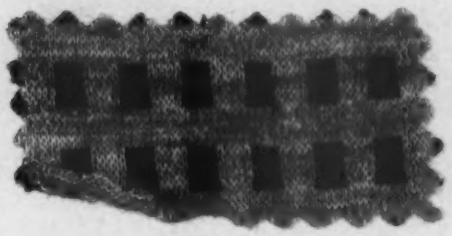
NYLON, ORLON AND TOTARN

***Flotilla*, cool, thin and crisp. Its frosty tracery gives a fresh clean look. By American Silk Mills.**



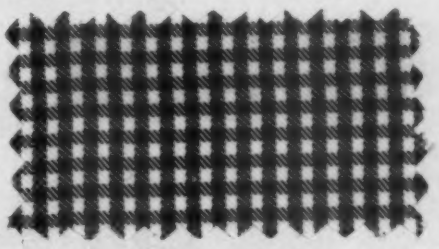
ORLON AND NYLON

***Mellennia* sheer, crisp and iridescent. Crush-resistant, dries quickly. Can be permanently pleated. By Cohama.**



ORLON AND WORSTED

***Thalspun*, a soft-textured knitted fabric of Orlon and a small percentage of worsted. By Alamac Mills.**

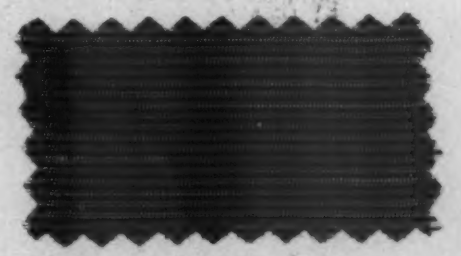


ORLON AND SILK

This Stonecutter check gains crispness of hand with the use of Orlon. Noncrushable, washes easily and dries fast.

ORLON AND WOOL

***Lorette* has a fine worsted type hand, is washable, wrinkle-resistant. Warmth without weight. By Milliken.**



ORLON AND ACETATE

Juilliard's *Double Daru* combines Orlon and acetate which, when cross dyed, emphasizes a slubbed character to this fabric.

A Program for the Future

The nylon textile fiber is being produced as monofilament, multifilament and staple yarn, but despite increased production by the Du Pont Company and others licensed to make this fiber, nylon is still in short supply. This shortage is due largely to the ever expanding market for this versatile fiber and to the fact that a considerable amount of yarn is being allocated for military purposes.

* * *

Orlon, the trademark for Du Pont's acrylic fiber, is today being produced as continuous filament yarn and as staple. A plant with an annual capacity of 6,500,000 pounds has been built at Camden, S. C. for the manufacture of filament yarn, while a second plant with a capacity of 30,000,000 pounds of staple a year is nearing completion and is scheduled to be in operation by July, 1952.

* * *

Dacron is also a Du Pont trademark for its polyester fiber, and while considerable development work has been done, fabric is only available in small quantities for consumer purchase. A plant for the manufacture of Dacron polyester yarn and staple is being constructed at Kinston, N. C., and when completed in 1953 this plant will have the capacity of producing 10,000,000 pounds of continuous filament and 25,000,000 pounds of staple and tow a year. A pilot plant at Seaford, Del. is now supplying yarn, staple and tow for the purpose of market evaluation by the textile industry.

A patterned mixture in which the cross-dye treatment and the alpaca brought to the face intensify the heathery tone. By FORSTMANN

American Fabrics presents

HEATHERS

another answer to

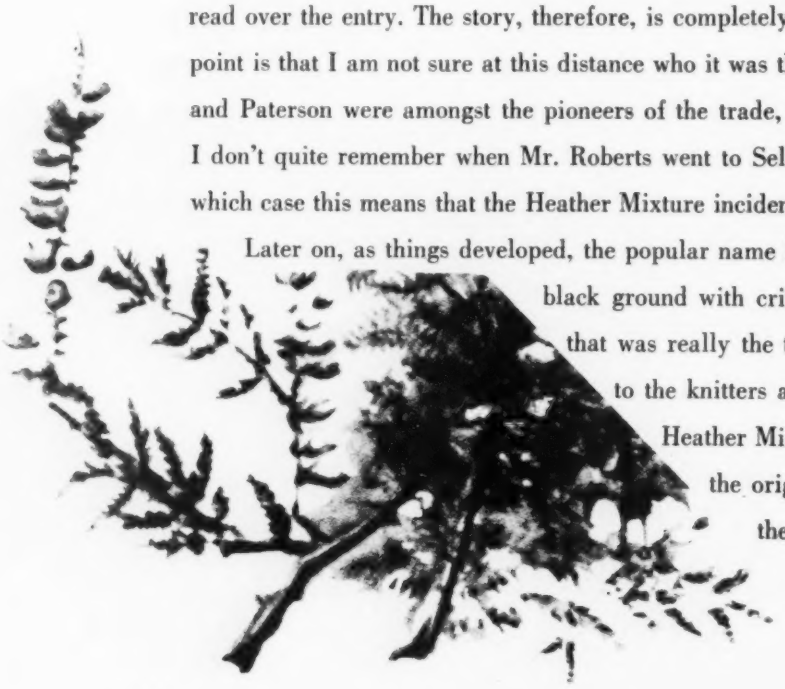
Creative Starvation in the Textile Industry

EDITORS' NOTE: *In exploring the subject of heathers, we came across the following version which may form an interesting clue to the beginnings of heathers as we know them today. It was sent to* AMERICAN FABRICS *in a letter from a director of one of the oldest Scottish woolen mills.*

When the original George Roberts was in Galashiels, before he moved to Selkirk, his weaving room in the old mill overlooked Buckholmside. One day when his Edinburgh customer . . . I think Romanes and Paterson . . . called upon him, Mr. Romanes looked across to Buckholmside which in those days was covered with heather and bracken, and admired the beautiful color effect in the sunshine. He said to George Roberts, "If you could produce a tweed like that we should sell it well."

So Mr. Roberts went up next day to the hill and collected some armfuls of heather, bracken and so forth . . . the different things that composed the effect of the hill . . . built them up in the corner of the handloom flat, and with his colored wools started out to match the heap. He then mixed the wools together and made what he called HEATHER MIXTURE.

It is all recorded in an old notebook of the late Mr. Alexander Roberts of Faernieles. He had the story from his own father, the original George Roberts, and Mr. Jack Roberts has now, or did have, the notebook in his possession. Years ago he sent it to me that I might read over the entry. The story, therefore, is completely first-hand and authentic. The only point is that I am not sure at this distance who it was that came from Edinburgh. Romanes and Paterson were amongst the pioneers of the trade, and it was probably Mr. Romanes. I don't quite remember when Mr. Roberts went to Selkirk, but I think it was in 1836, in which case this means that the Heather Mixture incident occurred before that.



Later on, as things developed, the popular name Heather Mixture became applied to black ground with crimson and green mixed into it, and that was really the type of mixture that became known to the knitters as Heather Mixture. I think the real Heather Mixture must have been something like the original Lovat which was conceived on the same lines to form a protective coloring against the heather covered hills. — E. S. Harrison

XUM

XUM

HEATHERS

another answer to

Creative Starvation in the Textile Industry . . .

Emerson Pointed the Way a Century Ago . . .

WHEN THE GREAT American thinker wrote . . . "A creative economy is the fuel of magnificence" . . . he stated a business axiom of great depth.

In the light of current and probable future conditions the conclusion must inevitably be drawn that unless the textile industry . . . from spinner to finisher . . . draws substantially and constructively from the pool of Creative Thinking, its sales must suffer a decline. Make no mistake: some mills will survive difficult times better than others, and much of the difference will be determined at the level of CREATIVE THINKING in relation to production.

Those firms which continue to provide ideas to their cutters which can be translated into consumer appeal will gain and retain a position of security for the future. Their goods will sell faster; their net profit will be better; their readiness for the tough years which may be ahead will be greater. If the military sages are right in the belief that the time to prepare for war is in the midst of peace, then the time for the textile industry to prepare for rugged conditions is right now.

The American fashion economy, which depends so much upon the factor of change and new ideas for its existence, must inject more and more of CREATIVE THINKING into its fashions and fabrics . . . must experiment, must develop fresh ideas in texture, in weave, in finish, in pattern and color. It must keep creative muscles flexed, lest atrophy of inspiration set in and retard movement when the textile industry's safety may depend upon the ability to move fast.

CREATIVE THINKING requires looking at the world objectively, as if you had never seen it before. For example, you see a bit of a shrub in your every day life. It is part of your life and you call it *Heather*. This Heather idea can be processed into many things if you are not content to pass it by as merely another item in your daily life.

Think about it . . . and it becomes a rough bubbly textured fabric with the blending of all outdoors in its colors. It becomes muted checks in a bit of gingham or, in a multi-toned district plaid. Dwell upon it . . . and it is transmuted into soft lovat drapes that tie the interior of a living room with the vista from the picture window. Examine it still further . . . and it endows the traditional tweeds with surprising promotional possibilities. Its soft neutral tones offer a perfect theme against which improvisations of spectrum colors can work in orchestration. It's the felt of a new hat, the velvet of a chair, the comfort of a rug, or the magic of a coat. CREATIVE THINKING can make the single Heather infinite!

* * *

The consumer's worst complaint during the years of the last war stemmed from the monotony of the fabrics which were available. The depressed condition of this industry was a reflection of that complaint, translated into inactivity in the retail store just as soon as the consumer had a free choice. Nobody within the industry would welcome a return of such buying apathy; but it is only by a continuous and enthusiastic offering of textiles which reflect CREATIVE THINKING . . . now, and through the years to come . . . that we can ensure a steady flow of profitable business in the industry.

Heather, a romantic flower born on the Scotch Moorlands, can be transmuted through the alchemy of CREATIVE THINKING to bring new life to a jaded fashion market.

(*please turn*)

The Story of Heathers

Up among the purple Heather
No' a flow'r that man can gather
Frae garden fair
Or greenhouse rare
Can beat the bonnie, bloomin' Heather!

The Scotsman's love for *Calluna vulgaris* . . . heather . . . is not inspired, as is the Irishman's for the shamrock, by sheer sentiment alone. Far deeper motives move the Caledonian, for without heather there would scarcely be a Scotland.

This handsomest of evergreens with its purple stems, close-leaved green shoots and feather spikes of bell-shaped flowers had the added beauty of rare utility.

In ancient Scotia, they used heather for the walls of the houses, for the thatch of the roofs. They cleaned these shielings with brooms and brushes of heather and made baskets of the root to hold their belongings. They dug heather with peat attached and this was the fuel that heated the highland houses. Heather blossoms were their beds and the ancients made a heady heather ale to give them further cheer.

The ancient crones used heather for charms and incantations. The young wives used it for dyes for their tartans. Doctors made heather medicines and war lords used its bonnie image on their escutcheons. Poets sang songs of the heather and the wild grouse of the moorlands thrived on its capsules. Sheep and kine grazed in the heath and their flesh and milk became more wonderfully flavored. Bees made heather honey and queens wore bridal bouquets of heather to insure love.

Never had a nation more cause to be loyal to its most humble servant than have the Scottish people to be true to their heather.

Yet heather is not indigenous to Scotland alone. The species is known throughout the civilized world. The Italians call it *erica,* the Germans dubbed it *heide* . . . and called their prettiest youngsters by the same name. In Danish the word *lyng* means heather, and ling is a common term for this plant in all parts of the world. The Spaniards identify it as *brezo* and their neighbors the Portuguese call it *erice.* Behind the Iron Curtain it is known as *werese* and only the French drift from the common appellative and call it *bruyere commune* . . . the roots of which are used to make French Bruyere pipes.

The original name *Calluna* is derived from the ancient Greek *kallynein* meaning *sweep* (it also meant adorn). This was engendered by a Sanskrit term meaning the same thing. It seems that our heather is known in many places of the globe and has been used for primitive broom making or decoration wherever it was found.

Heather is mentioned in the Bible. Ulfilas renders a gothic translation of Matthew (VI 28) as "consider the blooms of the heath" (heather) instead of "consider the lilies of the field" as more recent translators have it. In the Old Testament Jeremiah (XVII 6) says "for he shall be like the heath (heather) in the desert."

The Church of Scotland made much use of heather in a temporal sense. Dunbar, Scottish monk and poet, wanted nothing more than a kirk covered with heather thatch and said so in his poem which reads:

Grait abbais graith I will to gather
But ane kirk scant covert with Hadder.

It was common practice for the church to punish sinners by making them "Pu' a few birns o' fine swach heather to make it waterticht."

Naturally, such a plant contributed to the tools of wordmakers and our fathers used such descriptive phrases as *heather and dub,* meaning rough and ready . . . *take to the heather,* meaning to flee . . . *set the heather on fire,* meaning to raise a commotion or disturbance.

Heather as a natural dye became the staunch ally of the warring Picts and later the Scots who fled from Viking, Roman and Englishman alike to bide their time and strike back. Heather dye so perfectly blended the field costumes of the warriors with the soil colorings that they became a natural camouflage.

The wives and daughters of the Highlanders found in heather a magnificent and abundant dye-stuff. They dyed their yarn,

which was a yellowish color, by boiling it in water with the green tops and flowers of the plant. Later the woolen cloth was again boiled in alum water and afterward a strong decoction of the tops gave it a fine orange color. In the latter case only heather from a shady spot was used. It was pulled before flowering.

The process of dyeing with heather dyes was to wash the thread thoroughly in animal urine, a process as old as dyeing itself. It was then rinsed and washed in pure water and put into the pot of dye which was kept aboil on the fire. The thread was now and again lifted out of the pot on the point of a stick and plunged back again until thoroughly dyed. The yarn was then hung out to dry to be ready for the weaver's loom. Tartan dyed in the Highlands 130 years ago and used ever since, still exists . . . the green being purely from the heather. The strong yellows and oranges redyed with blues and reds gave the beautiful greens and purples we associate with Clan Tartans.

An interesting sidelight on heather colors is the fact that Lovat, a term used to designate a dusty, moorland green, was named after the Scottish chief and Jacobite rebellionist, Baron Simon Fraser Lovat who dressed three hundred recruits in green of this color and entered them in the services of William and Mary.

In some western islands the inhabitants tanned their leather in a strong decoction of heather. The shoots were employed for tanning and were a good substitute for oak bark and other astringents. In 1776 the Irish Parliament valued this application so highly that a grant of £700 was made to a person who invented a mode of using heather in the preparation of leather.

Heather Emigrates to America

Emigrant Scots arriving at Nova Scotia brought with them pots of heather, the roots of which had been stripped of soil and wrapped in damp cloths to keep them alive. Upon being transplanted, the plants died and left the Scotsmen desolate. What they didn't know was that heather lives in perfect symbiosis as the host of a fungus — a white threadlike substance that clings to the roots and makes the soil acceptable to the plant. The destruction of this fungus meant the death of the plant. It seemed to these lads and lassies as if the new world would ever be a strange one for them and their descendants, but some three generations later a miracle occurred in New England which set the bagpipes reeling and the kilties awaggin'.

To quote a report from a newspaper of the times, here's what happened:

"Quite a stir was created in the botanical world when a plant of Calluna vulgaris, in a pot, was exhibited by Mr. J. Dawson, a young gardener of Cambridge, Mass. Mr. Dawson discovered the heather growing wild near Tewksbury, Mass. So great was the enthusiasm in the matter that the Society (Botanical) at once instituted an investigation and a committee was dispatched on an errand of discovery. The heather was then in full bloom. The committee reported that plants were found half a mile from the State House at Tewksbury, and were spread over an extent of half an acre. The common cranberry occurred somewhat abundantly in the immediate vicinity of the heather (usually in the depression) while the heather was found on the hummocks. The soil was sandy peat, just that which the gardeners would choose for the heaths."

As a Symbol

Following this event Whittier wrote:

No more these simple flowers belong
To Scottish name and lover.
Sown in the common soil of song,
They bloom the wide world over.

In smile and tears, in sun and showers,
The minstrel and the Heather,
The deathless singer and the flowers
He sang of . . . Live forever!

Our versatile heather was a clan badge. It was the Roman eagle, the Greek laurel and the Egyptian ankh all rolled into one. The feeling inspired by this bloom is ably told by Ian Lom:

Not safe were they who rashly met
Thy warriors stern and true
When proud heather-badge set
In all their bonnets blue.

The Germans of World War I were well aware of the significance of heather worn in the bonnets of the *Ladies from Hell.* But long before this time, heather inspired Highland

(please turn the page)

Vanity Fair's cartoon of the Flower Committee of the Massachusetts Horticultural Society searching for the heather at Tewksbury, Mass.

warriors and made their claymores the dread of their enemies.

Heather was the badge of the MacDonalds, the Lords of the Isles. The Donald wore a heather sprig in his helm at all state occasions and swore by it. It became a war-cry when added to the terrible sounding phrase *Fraoch-eilean* . . . which actually means a healthy land.

While the Drummonds wore the holly, and the MacGregors the pine, many of the other clans combined the heather with their own particular insignia. This led to a later adaptation of the heather as a magic symbol of the Scotch fighting man. It probably started in the time of Bonnie Prince Charlie as so poignantly sung in the poem:

Come tho' the heather, around him gather,
Come Ronald, come Donald, come a' thegether
An' crown your rightfu', lawfu' King,
For wha'll be King but Charlie.

Lauded in Poetry

But from the sterner side to the lighter touch, heather was the connecting link. It was a symbol of white magic. The elves and pixies played and hid in the heather. A touch of heather and white ash on the lintel avoided the evil eye. White heather meant love fulfilled and was always part of a lover's bouquet. Blaikie tells of this in his poem which starts:

A sprig of white heather I plucked on the brae
To whom shall I give it?
To whom shall I give it?
Not to the sportive, the light and the gay.

Queen Victoria well believed in this delightful magic for she always cherished a sprig of white heather taken from her wedding bouquet.

Such a hard headed Scotsman as Mr. Andrew Carnegie believed in the magic of heather, too. At a meeting of the St. Andrew's Society, the favors given were orchids. A Dr. A. M. Stewart had brought a plentiful supply of heather to this dinner and it is related that when the heather was brought into the banquet room, fingers started to itch, elbows crocked involuntarily and before you could say "It's a braw, brecht, moonlicht nicht," the floor was strewn with orchids and every buttonhole sprouted a heather bloom!

Nor can we forget a verse from one of the favorite vaudeville songs of the late Sir Harry Lauder:

I love a lassie, a bonnie bonnie lassie,
She's as sweet as the heather in the dell;
She's as sweet as the heather,
The bonnie bonnie heather,
She's as sweet as the Scotch blue bell.

As a medicinal plant, heather has little or no value in today's pharmacopoeia. But in ancient times such medical great ones as Galen recommended it "for sweating and the easing of body worms and also against the stings of serpents."

Heather Ale

One of the fascinating tales of heather . . . the lost art of making heather ale . . . was told in a poem by Robert Louis Stevenson. Heather ale, according to the ancient writer Boethius, was an invention of the Picts who destroyed its formula rather than surrender it to the wild invading Irish. His recipe for this brew renowned in song and story was to mix two-thirds of the young tops of the plant with one-third malt, adding hops. But no one has been able to brew a satisfactory beverage according to this formula. Walter Scott in *The Monastery* says:

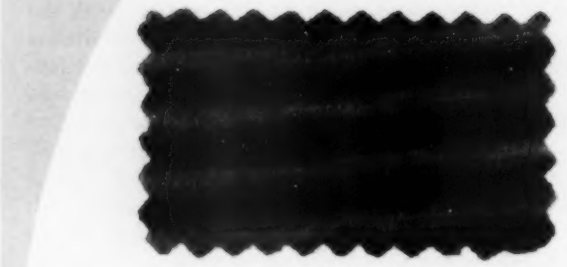
The Picts were undone, cut off mother's son
For not teaching the Scots to brew Heather Ale.

Stevenson carries this poetic fancy into detail in his poem *A Galloway Legend*. The story concerns Mickle Mouthed Meg, a lass who after a dram of usquebaugh let her tongue wag and delivered to the enemy the last brewer and his son who knew the secret of making heather ale. When brought before the Scot king, the Pict father, fearful of his son's revealing the recipe, said he would tell the secret of making this delicious drink, but he was afraid of his son, who stubbornly refused to talk. The king thereupon threw the son into the sea and drowned him, whereupon the triumphant father said:

True was the word I told you;
Only my son I feared
For I doubt the sapling's courage
That goes without the beard.
But now in vain is the torture,
Fire shall never avail,
Here dies in my bosom
The secret of Heather ale!

* * *

An appropriate climax to the legend of the Heather lies in an old Scotch tradition. It is customary when sending a gift of fresh grouse, or a haunch of venison, or some heather honey, to enclose a bit of heather. The receiver of the gift must wear the heather if the wee folk are to look with favor upon him! It is with the thought of this tradition that THE HEATHER STORY is offered for new style inspiration.



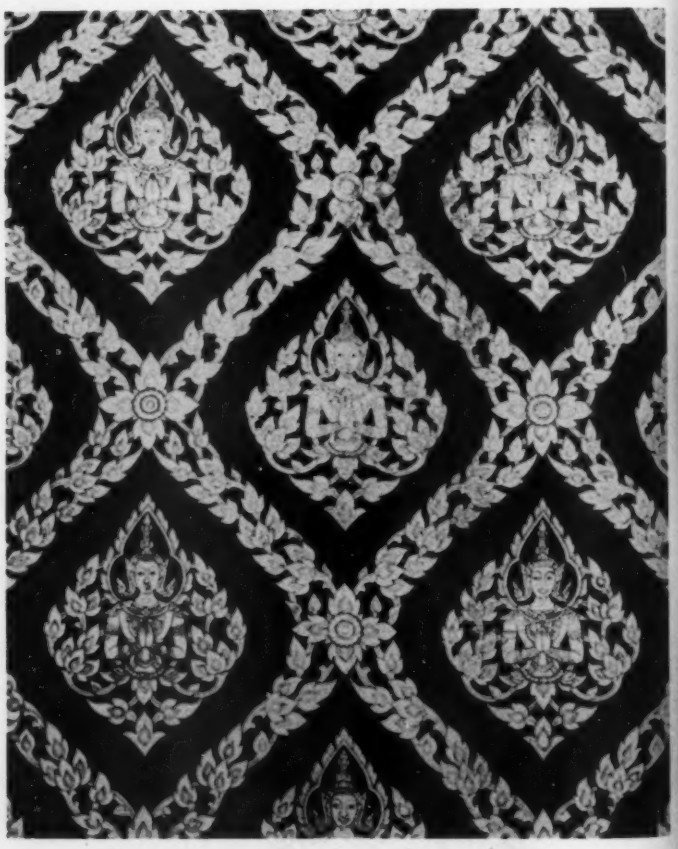
An all wool worsted jersey with heather ombré stripe. By I. A. WYNER

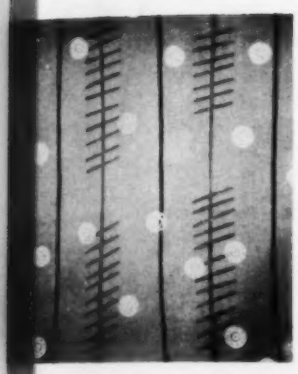
Some heather tweed swatches are shown in the photograph on the opposite page

XUM

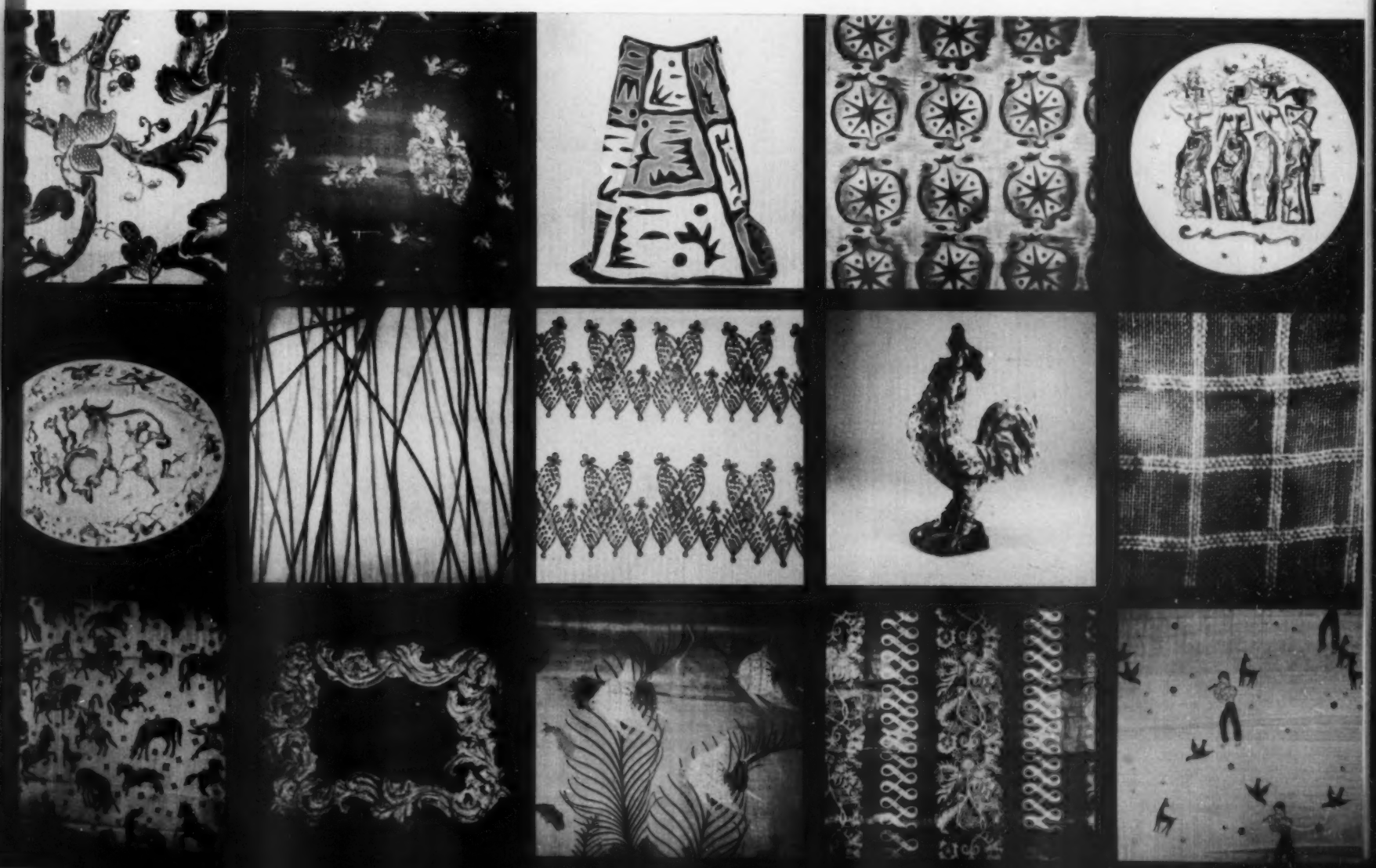
The pine motif, usually attributed to Persian or other Near Eastern sources, is illustrated at left in a typical Siamese decorative motif which shows early Buddhist deities with halos formed in the shape of pine cones. Below is another early decorative motif of Siam, that of the three-pointed petal representing leaping flames (see page 120 for description of symbols as well as for close-up of the flame symbol).

Decorative Symbols from Siam





DESIGNS *from Europe*



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SHAKER BUILT STAIRCASE,
MID-NINETEENTH CENTURY
FROM INDEX OF AMERICAN DESIGN

XUM

THE SHAKERS

An American Phenomenon

The Shaker story points to a way of life . . . a philosophy embracing simplicity, economy and attention to the ordinary things of life as worthy of men's best. The list of inventions credited to the Shakers, their designs and their craftsmanship represent a distinctive element in American industrial philosophy and in American industrial design. Precisely this element of intelligent craft, plus the realization that to fill the needs of everyday life is worthy of the best we have . . . not merely the factors of size and weight . . . these elements helped to make American industry outstanding.

BY JEROME COUNT

Nowhere in the American past is there a phenomenon that quite parallels the heroic and touching story of the Shakers.

Shaker beginnings in America were represented by a tiny group of eight English refugees who emigrated here just before the Revolution, believing their leader, Ann Lee, to signify the second coming of Christ. They gradually gained adherents, spread through many eastern states and established prosperous communities, owning millions of dollars in landed wealth and property. Now, over 150 years later and again reduced to but a handful of remaining members, the sect looks back on the creation of a vital folk culture of their own that strongly influenced the ethical attitudes and esthetic standards of many generations of Americans.

Living a communal life in their own Utopian communities, these *Shaking Quakers* were known to millions of Americans throughout the 1800's as a bizarre and heretical religious curiosity. They never numbered more than six thousand members; but, spanning the rise of the machine age, they survived as a major carrier of the colonial craft tradition through their uncompromising attitude toward integrity of work and by their superb mastery of design and technique in handicrafts.

In the last century, machine production was sweeping away the simple handicraft culture with low-cost methods of mass duplication of everything from flower-festooned cast iron stoves to ornamental fringes for the Sunday surrey. Yet, throughout the same period of gaudy, shoddy production, thousands of American families treasured trim-lined Shaker chairs and oval boxes in their front parlors and these represented the substance of a tradition in applied craftsmanship which was to blossom in the twentieth century as American industrial design.

For the Shakers had incorporated in their laws, held as religious tenets, the same standards of taste and design which had been imposed upon the early American craftsman by the necessities of his hard struggle for survival. "Fancy articles of any kind," the Shaker laws said, "or articles which are superfluously finished, trimmed or ornamented, are not suitable for Believers . . . Believers may not . . . manufacture for sale any article or articles which are superfluously wrought, and which would have a tendency to feed the pride and vanity of man . . ."

Influence on Design

Functionalism, not yet a term of public currency, was no mere matter of taste with the Shakers. It was a subject of re-

(please turn the page)

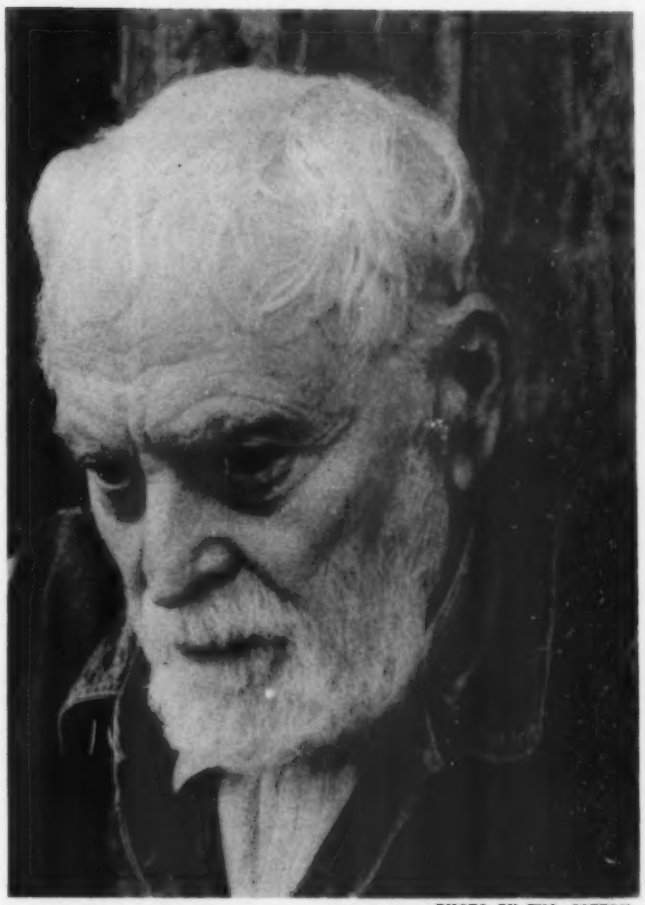


PHOTO BY WM. COTTON

Brother Ricardo, a present day Shaker, at the age of 82.

Teaching two youngsters at Shaker Village Work Camp the Shaker tradition of uncompromising craftsmanship.

ligious conviction. Beauty for beauty's sake was abjured because it had a tendency "to feed the pride and vanity of man." Good craftsmanship and design were dictated not by sales appeal, but as intimately related to concepts of mortal sin and one's place in the hereafter.

Contemporary designers who trace their inspiration chiefly to modern trends in architecture and its related fields overlook the significant fact that functional design had been a notable facet of the American scene for the greater part of a century before modern architectural design made itself felt. For generations, throughout the 1800's, the starkly simple furniture and furnishings, the communal dwellings and workshops of the Shakers, their tools and textiles, were widely accepted symbols of *plainness* and *neatness* in household and industrial design. Hardly a visitor to their famous settlements, from Nathaniel Hawthorne to Charles Dickens and Walt Whitman failed to make this observation and draw moralistic conclusions from it.

Shaker sewing desks with raised rims to prevent needles, spools from falling off. Note the swivel chairs, an original product which points up the ingenuity of the Shaker furniture makers.

The Shakers were a dedicated people. Their devotion expressed itself vividly in everyday terms. "Put your hands to work, and your hearts to God," said Mother Ann Lee. "Work as though you had a thousand years to live, but as though you may die tomorrow."

It was during the rise of the machine age, for example, that the Shaker chair continued to be a symbol of handicraft design and integrity of craftsmanship. "We always gave one for a wedding present as far back as I can remember in our family," an eighty-year-old New England farmer recently told the writer. "It was the one thing we knew would last," he added.

That the Shakers shunned ugliness, as well as superfluous ornamentation, seems self-evident upon a study of the typical Shaker chair. Any craftsman who has attempted to terminate a long post, such as the rear ones of the Shaker chair, knows that it cannot be done to good esthetic advantage with a mere rounded or pointed end. In commercial versions of the slat back chair, the problem is usually met with a turned ball. The Shakers did it with a delicately turned pear- or acorn-shaped finial. Its function was purely an esthetic one. Long before functionalism was a crystallized philosophy of design, the Shakers recognized that it had limitations and they realized that functionalism meant something more than mere utility. Yet the finial of their chair could hardly be said to sin against their sacred law which was opposed to superfluous ornamentation.

Industrial and Human Values

Their protest against the inroads of the machine age stemmed no less from personal knowledge of its effects on human values. Ann Lee herself had been a worker in the early cotton textile mills of Manchester, England. Her followers were aware of the efforts of a famous reformer and cotton textile manufacturer of the same period, Robert Owen, who was experimenting with Utopian ventures. He personally observed a Shaker settlement before setting up his own experimental community in New Harmony, Ohio, in the early 1800's. The Shakers were undoubtedly influenced, too, by the work of another famous English reformer of this same era, William Morris, a professional decorator who came under the literary influence of Thomas Carlyle and John Ruskin, and who preached the dignity of work and the unity of designer and craftsman.

The dynamic drive of this long current of reform extends into our own times. As late as the present century, the great Indian reformer Gandhi credited the same Ruskin with the inspiration to devote himself to a life of cooperative labor and the revival of hand spinning and weaving, which became a dramatic symbol of India's struggle for freedom. Is it also an intriguing coincidence that Gandhi, like the Shakers themselves, assumed the vows of a celibate life?

Hostility and Persecution

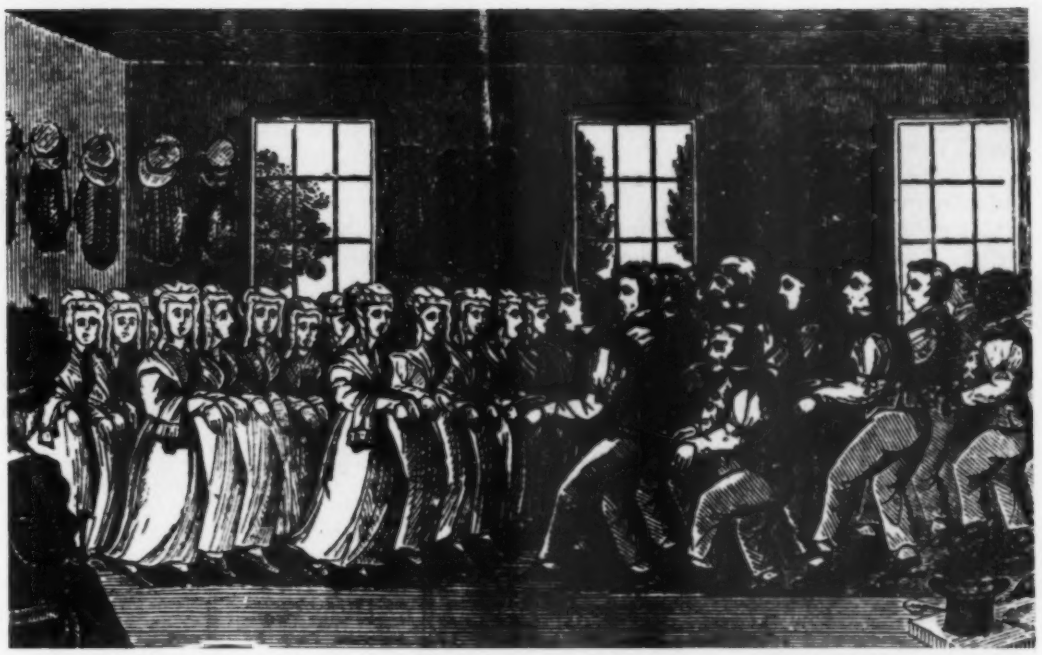
By a cruel irony, it was the Shaker insistence upon the celibate life that brought on some of the most difficult trials of their early years. Some Americans, afflicted with a reverse-Puritanical hangover, refused to credit the Shaker claim of sexual purity within their own communities. There were rumors of secret orgies between the brethren and sisters. Sensational books and pamphlets appeared, attacking their morals, charging them with naked dance ceremonies in their religious exercises and accusing them of a long catalogue of heretical and immoral practices. "Shakerism Unmasked," is one of the typical titles of the printed attacks that appeared in the early 1800's. One of these ancient books was even published with several *sealed pages*, to insure that certain sensational tidbits should not be read by unauthorized eyes, although their inclusion in the volume was cleverly featured on the title page of the book.

The Shaker Mission

These literary attacks had been preceded by earlier periods of physical mob violence against the Shaker people and their peaceful settlements. Later, the hostility was focused in legislative investigations and restrictive laws were enacted by several states to limit their acquisition of property and wealth. America had begun to fear the Shaker experiment in communal living as a threat to the established order. Yet, throughout a large part of the long period of these attacks, extending over some fifty years, the many products of the Shaker workshops were being widely sold across the countryside. Throughout New England and along the Mississippi valley, as far south as New Orleans, the Shaker peddling wagon was a familiar sight. It was driven by a Shaker brother, dressed in the characteristic long waistcoat and broad-brimmed hat. He was known for his honesty and simplicity. The

Shaker Mitten

COURTESY NATIONAL GALLERY OF ART, WASHINGTON



The Shakers' sacred dance from which the strange sect got its name. Facing each other, men and women shake and thus, according to Shaker lore, cast out evil.

wagon was loaded with a variety of products, such as brooms, brushes, baskets, preserves and boxes. As hand-made Shaker products, they were recognized as the finest obtainable — a heart-warming survival amid the onrush of the machine age and one which carried a message of ethical conviction and social mission.

Rediscovery of Shaker Influence

Now, with surviving specimens of their remarkable products largely in collectors' hands, the fascination that these remote people held for the American public for almost two centuries extends into the present day. Historians still seek to explain them, Freudians to analyze their celibate life, and writers to dramatize their story in novel and stage-play. Social reformers study the record of their serene communities, where, as one visitor had put it, "Every day is like Sunday."

Modern artists, in music and dance, search their religious music and ceremonies for inspirational material. A score of libraries and museums treasure their literary examples and their handicrafts. One of the original Shaker Village communities serves as a summer work camp where a group of teen-age boys and girls find inspiration for their own manual crafts and cultural activities. As reflected in some of the most recent work of Paul McCobb and others, contemporary designers, too, are studying Shaker textiles, dress, furnishings and furniture for enriching source material.

The current rediscovery of the Shaker influence demonstrates again the vitality of their cultural contribution to America. As a functioning group of communal settlements, they failed to withstand the inexorable economic consequences of machine competition; as celibates their survival power was less than that of other sects; their religious influence was negligible. But they will long survive as a symbol of our integrity in craftsmanship . . . and as an uncompromising esthetic conscience on the American scene.

* * *

In an accompanying photograph of a present-day Shaker, taken recently at the age of 82 years, the sensitive observer may find the answers that neither historian nor social reformer has discovered. It is a face that looks back almost to Civil War days when, as a boy, Ricardo was left with the Shakers to be cared for. When he came of age, he elected to remain and joined the order, then still near its crest of promise. Born in an age overrun by machine production, he nevertheless became a highly skilled craftsman in the finest Shaker tradition. Having spanned the life of the order, from almost its greatest achievement to its present decimation, he recently said to the author, "Yea, we served our purpose." It was said quietly, not in resignation, but with contentment.

END

What great core of truth did these sober people hold who called themselves communists, but were held in contempt by Marxian socialists . . . who refused to participate in civil government, but insisted upon paying taxes on property that could be exempted . . . who declined to vote, but carried sufficient influence to be visited by American presidents . . . who refused to bear arms in war, but tenderly cared for the orphans of soldiers who were killed?

Always receptive to humane movements, they gave long and practical support to the earliest organizations of citizens to secure international peace. A people who accepted truth in supernatural visions and miracles, the little band of English refugees aboard ship at sea nevertheless set vigorously to manning the pumps after receiving a heavenly message that they would be saved from the raging storm. Out of the "unwhispered shames of all womankind," as one of them put it, they were pioneers in their recognition of equality for women. — J. C.

SHAKER

philosophy and craftsmanship

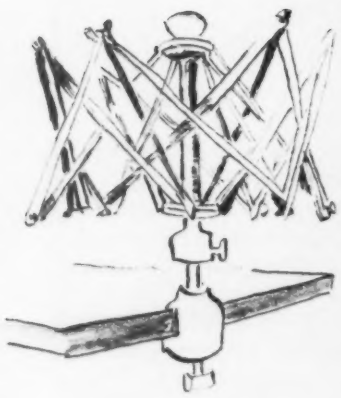
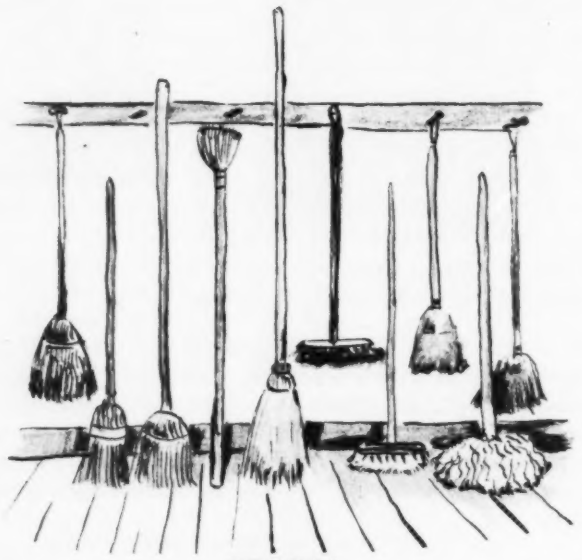


TABLE SWIFTS

You must not lose one moment of time, for you have none to spare . . .

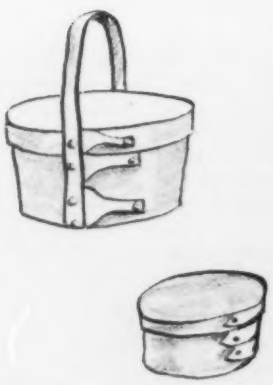
The manufacture of a multitude of carding devices, hand and machine, was a source of considerable revenue to the Shakers. To satisfy the demand for all kinds of weaving apparatus, a manifesto was issued to the *families* to employ every spare moment to assist in the production of Shaker reels, spinning wheels and table swifts. The table swift, sketched above, was used to wind the yarn into balls. The yarn came in skeins and the swift could be adjusted to handle a skein of any size. The making of a swift of this kind called for patience, effort and an application of attention which ordinary workmen would find difficult to sustain. These swifts were beautifully and carefully constructed in every detail.



BROOMS

Clean your room well; for good spirits will not live where there is dirt. There is no dirt in heaven . . .

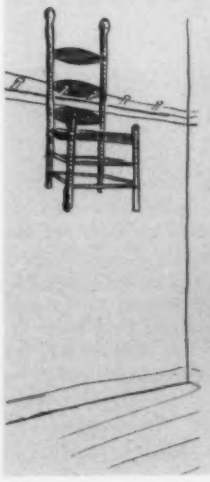
The broom was a symbol of Shakerism. To quote a 19th century writer on the Shakers, "The manufacture of the broom is one of their favorite industries, and they have more ways of making it useful than are known to the outside world. They never disgrace it by making it stand behind the door, as if it were responsible for the untidy litter about the house. The Shaker broom is always hung up against the wall when not in use. They put a clean white cotton hood on some of their brooms, and when thus equipped use them to dry-polish their smooth hardwood floors and to remove the last trace of dust from the hard and shining surface." The Shakers were among the first American communities to raise broom corn and to manufacture their own brooms.



OVAL BOXES

Labor to make the way of God your own; let it be your inheritance, your treasure, your occupation, and your daily calling . . .

Few products of the Shaker woodworking shops possess greater charm and wider appeal than these oval boxes which were generally sold in nests of twelve. The rims of the boxes were usually made of maple, and the tops and bottoms of pine, with the overlapping fingers held together by copper rivets. In 1805 two *neasts* of boxes sold for $3.33. Today they are collectors' items. It is interesting to note how the Shaker craftsmen, taking as model the human hand, conceived the idea of constructing these boxes with the fascinating and practical overlapping fingers. To set the wood into oval shape, the Shakers used a special wood-steaming technique.



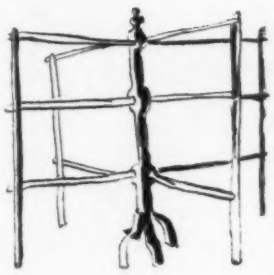
THE PEG BOARD

Do your work as though you had a thousand years to live, and as if you were to die tomorrow . . .

Characteristic of Shaker neatness is the extensive use of the peg board. Almost everything that was not actively used was hung on these wood wall pegs which protruded from the rack. For church services, each member went to the rack for the chair. During daily dustings chairs were hung up — a very typical example of the practicality of the Shakers. Clothing, mirrors, wall clocks, footwarmers and a host of other Shaker articles were hung on the peg board when not in use.

CLOTHESHORSE

Take good care of what you have. Provide places for your things, so that you may know where to find them at any time, by day or night . . .



"The true gospel of simplicity naturally leads to plainness in all things." This attitude led the Shakers to put everything in its place and to keep in convenient out-of-the-way places those articles not in actual use. This clotheshorse is a frame on which to hang clothes for drying and is just one example of the many racks which were required. Here again we see a Shaker principle of construction...simplicity, adaptability, functionalism. The clotheshorse itself could be quickly and easily folded into a compact unit for minimum space when not in use.

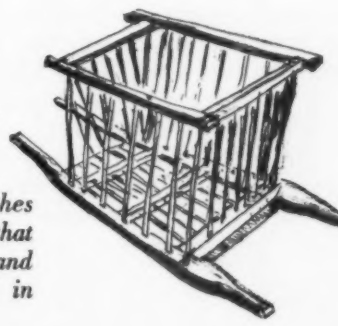
Built-in Cabinet at Hancock, Mass., which embodies basic principles to be found in many modern designs.

SHOEMAKER'S BENCH

If you improve in one talent, God will give you more . . .

The Shaker precept was Equality of Labor and everyone worked because it was understood that a man could bring to the smallest task the sum total of all that was highest in him. A simple cobbler's bench built primarily for the making and repairing of shoes is in itself a work of art. Like other objects made by the Shakers, it is intelligently conceived, superbly adapted to its function, finished with an artistry devoid of ostentation. Note the shoemaker's candlestick atop the cabinet.

A round Shaker barn presages airports of today.



LAUNDRY CARRIER

Keep your family's clothes clean and decent; see that your house is kept clean and your victuals prepared in good order . . .

The Shaker virtues of order and practicality find happy expression in this laundry carrier. Because the Shakers lived by the sacred principle of the dignity of work, each object that was created by them had to conform to the highest standards in craftsmanship. They believed in applying themselves diligently and no object was too lowly to bring to it the best skill they had. The laundry carrier is an example of the intelligence of the Shaker workmen. It embodies to an almost perfect degree the qualities of balance, airiness, minimum of surface, lightness and ease in handling. Modern decorators use the laundry carrier as a magazine rack.

SHAKER HAT

You ought to dress yourself in modest apparel as becomes the people of God and teach your family to do likewise . . .

The casting aside of worldliness was a great moving force with the Shakers, for well they knew what a trap the world held for those who sought self-development. All Shaker women and girls wore the head-concealing bonnets which were made with palm leaf and straw and trimmed and lined with silk fabrics of various colors. The making of these straw bonnets was an important Shaker industry for about forty years preceding the Civil War. The price, per bonnet, was about $1.

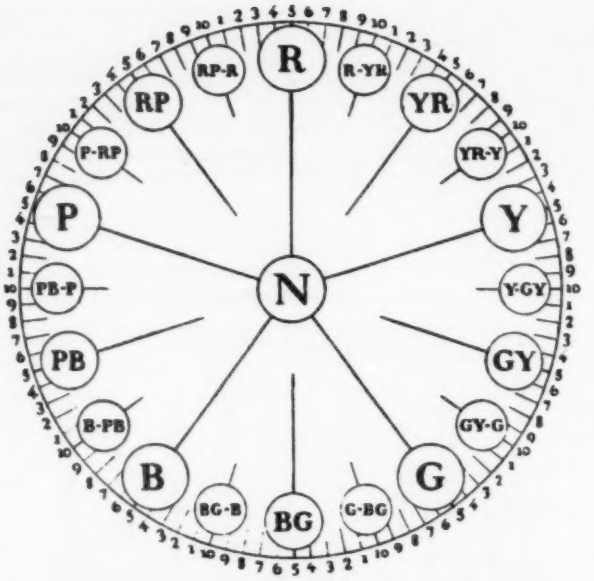
You are over in Paris on a business trip. You discover just the right fabric color to fill out your new line. You can wire your dye manufacturer, but you are unable to send him a sample. Would it be possible to give him a description so accurate that you could be sure of getting exactly what you wanted? The answer is "yes"; behind that answer is the story of modern color systems.

COLOR SYSTEMS . . .

THE LANGUAGE OF COLOR

BY

HOWARD KETCHAM



Arrangement of the 10 major and intermediate Munsell hues. Numbers indicate each hue.

ALMOST EVERYBODY sees color and has definite reactions to it. Great painters have long known how to use it to delight the eye and play upon the emotions. Yet few people, including the greatest painters themselves, have been able to talk about color with any degree of precision. The reason is simple — there has been no language.

When a musician says "middle C," the veriest amateur can pick out on the piano the exact note he means. A chord, which is the blend of several notes, can be specified with equal ease. A composer can write down an entire symphony so that a whole orchestra can translate it into sound exactly as he intended.

The art critic, on the other hand, talks about "a subtle yellowish green with overtones of grey," or "the color of ripe watermelon seen in the late sunlight." Try placing an order for something like that!

Color plays a part in the business and work of so many different people that terminology trouble can turn up almost anywhere. An exhibition featuring the color lines of certain British manufacturers displayed twenty-four different "Nile greens," forty "sky blues" and twenty-four "rusts." At one point in U. S. paint history one hundred and eighteen different colors were called buff by manufacturers and there were thirteen different varieties of "delphinium blue."

To describe a single sample of emerald green a group of artists came up with fifty-six different color designations. Another jury, at a convention of U. S. Pharmacopoeia, examining a cake of beeswax, dubbed it cream, yellow-white, light greyish yellow, yellow and pale yellow tint.

In 1927 a group of soil scientists of the U. S. Department of Agriculture sat down to color-name a set of 250 soil samples. Result: an average of 12 different color designations per sample!

Yesterday and Today

Color language was not always the problem it is today. The old master had a limited number of basic colorants made from natural earths, powdered shells or stones and vegetable juices. He knew their names and taught them to his helpers. He worked out recipes for additional mixed colors. (Three parts cinabrese and one part lime white, for example, for the robe of an apostle.) Grinding his own pigments and preparing his own binders, he was assured of their consistent quality. His studio was lighted by daylight. Standard materials, standard lighting, standard proportions — what science now calls a *controlled situation*. If the recipe failed to give standard results, the answer was simple — box the apprentice's ears.

Here were the elements of a color system — a way of talking about color in terms of known standards, and of transmitting color information accurately to others who needed it. Modern color systems serve exactly the same purpose.

But modern color systems meet more difficult and more complex problems. Research has added hundreds of new synthetic colorants to those previously available. We can no longer classify color in terms of a group of basic pigments. Dyemaking, textiles, ceramics, glass and the like, have passed from the workshop of the artisan to the plant of the manufacturer. Precise, accurate color information must travel by letter, telephone, cable, radio, across continents and over oceans.

Industry is a giant. It uses pigments, chemicals, and other materials not in ounces, drams or feet, but in tons, thousands of gallons and miles. What would be a minor mistake to the in-

dividual artist becomes, on the industrial scale, an error costing thousands of dollars in material and man-hours. Imperative to industry is a color language which prevents such blunders.

What is a Color System?

There are many ways of thinking about color. To the psychologist it is something seen by a human being, and involves a stimulus and a response. To the physicist it is projected or reflected light of certain wave lengths. To the manufacturer it is something he must control through reliable standards. As a result, not one but many color systems have been developed, each with its own uses. All of them, however, are based on the conception of a *color-solid,* whose dimensions are the three properties of color: *hue, value* and *chroma.* Colors are red, yellow, green, blue and purple in *hue* — light, medium, or dark in *value* — more or less intense in *chroma.* (Two colors may have the same *hue,* both red, for example. They may have the same *value,* one being neither lighter nor darker than the other. If, now, one is dull or greyish by comparison with the other we have difference in *chroma.*) Absolute white, the pure greys, and absolute black have *value* only. They have neither hue nor chroma, and are called *a*-chromatic.

Thus, *hue* is the *name* of a color. It is also called dominant wave length. *Value* is the *lightness or darkness* of a color. Other words for it are brilliance and brightness. *Chroma* is the *intensity* of a color, sometimes indicated by saturation, or purity.

Imagine a chart for each hue. A scale of values is the vertical axis, white at the top, greys, darkening as they descend, and black at the bottom. Anywhere along this *a*-chromatic axis we have zero chroma. Moving out on a horizontal axis chroma increases with each step. Take our charts for all the hues, stand them on edge, and arrange them in a circle in the order of the visible spectrum, red, orange, yellow, green, blue, purple, and around to red again, with the white-grey-black vertical axis at the center. We have laid out a *color-solid.* Lighter values will be found at the top, darker values toward the bottom, and the strongest chroma farthest out from the central axis of the solid.

Any color can be located and described in terms of the three dimensions: hue, value, and chroma.

Some Typical Examples

Different ways of setting up the data give different profiles to the charts and different shapes to the color-solids of each system. A closer look at two of them — the Munsell and the Ostwald — will help us to understand how they operate. In their theoretical state, these systems are quite abstract, and have been modified in actual practice. The examples of them we shall examine are not the so-called ideal versions, but rather the published versions in widest general use.

The published versions are actual books of color samples, because for practical purposes it is almost impossible to work with color specifications as a set of numbers and symbols only. It is desirable, if not essential, at some stage of the game to see what the color looks like.

The Munsell is called a *color appearance* or *color space* type of system. It arranges colors in order of hue, value and chroma as they appear to the eye. The smallest perceptible difference in bluishness between two greens, for example, would be a step or space in hue; the smallest perceptible difference in darkness or lightness a step in value; and the smallest difference in intensity a step in chroma.

Each page of the Munsell color book is devoted to a single hue. On the vertical white-grey-black axis, absolute black is zero, and absolute white is ten, but these colors exist only in theory. At the bottom of the chart, therefore, the blackest black is 1, and at the top the whitest white is 9. Zero chroma, naturally, falls on the *a*-chromatic white-grey-black axis, and steps in chroma are numbered from this point outward horizontally.

The ten major hues of the Munsell System are red, yellow-red, yellow, green-yellow, green, blue-green, blue, purple-blue, purple, and red-purple, arranged in a clockwise circle which comes back to red again. Each major division is broken down into intermediate hues, numbered from one to ten, with number five falling on the major hue itself. Major hues are designated by their initials: R, Y-R, Y, and so on.

The notation for any color is written in the order: Hue-Value-Chroma. Thus 6 YR 5/10 would be a red slightly more yellow than the major hue, 5 YR. The red would be neither very light nor very dark, and of strong intensity.

As we have already seen, each chart showing all the values and chroma for a single hue is really a vertical section of the color-solid. Slicing *horizontally* through the Munsell color-solid at different levels gives us a series of color wheels, each one showing all the hues and steps in chroma at a single value.

Steps in value and chroma in the Munsell System are always

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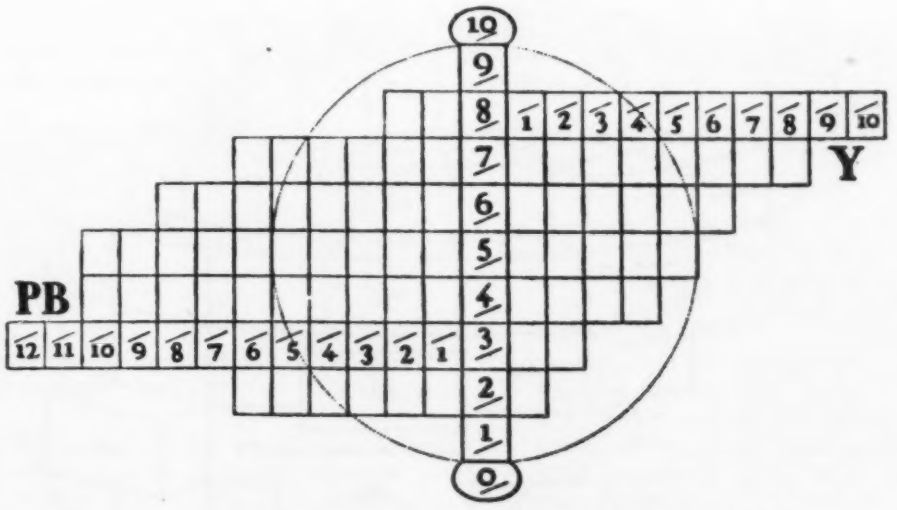
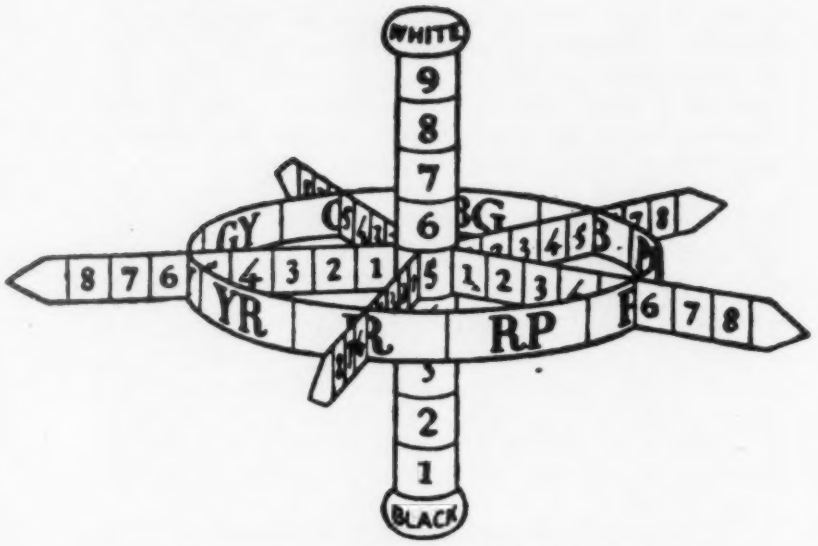


Munsell charts for purple-blue (P-B) and yellow (Y), with the neutral axis between. Purple-blue reaches its strongest chroma (12) at 3 value. Yellow's strongest chroma (10) is reached at a lighter value — 8.



The circle represents hues, the vertical stem values, and the horizontal radiating arms represent chroma.

equal, but the eye can discern more steps in chroma for some hues than for others. Red can have as many as twenty discernible steps. Blue-green has only about six.

Different hues do not go out to their maximum number of chroma-steps from the same level on the value scale. Yellow is capable of most variation in chroma when its value is light — at a value of 8 it has 12 chroma-steps. Purple-blue at the lower, darker value of 3, takes 12 steps in chroma. Thus, the profile of each hue chart in the Munsell System is different from the others, and the shape of the color-solid is irregular.

How the Color Systems Work

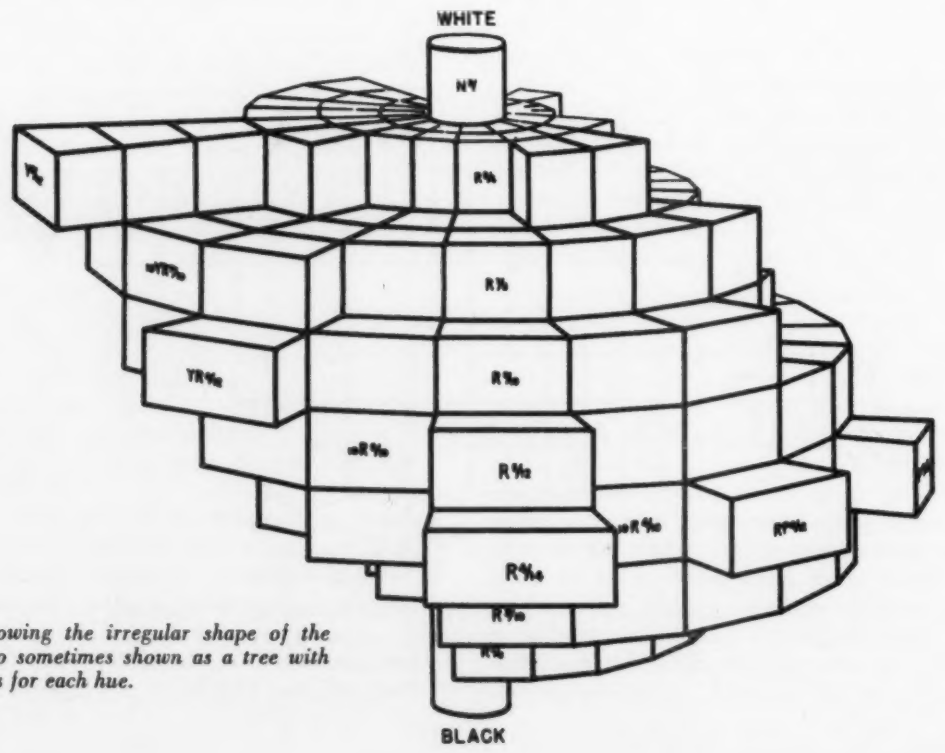
The Ostwald System is called a *color-mixture* system, based on additive mixture of the full chroma with gradated percentages of black and white. (We can make an *additive mixture* by spinning a disc, half of which is red and the other half white. Light reflected from the red section is *added* to the light reflected from the white section.) In the version we shall examine, the ideal range of colors is modified to meet ordinary commercial needs.

Like the Munsell, the Ostwald has a chart for each hue, with a white-grey-black axis. White, at the top, is labeled *a;* greys, getting darker as they descend, are *c, e, g, i, l* and *n;* black, at the bottom is *p.* It is important to remember that these letters do not represent colors, but *amounts* of white or black. Talking about white, *p* means zero white. Talking about black, *a* means zero black. We write these letters as pairs of coordinates, in the order white-black, to show the percentages of each present in the color. Thus, *pa* means the full chroma (no white and no black are present). On the chart, the point *pa* makes the third angle of an equilateral triangle with white and black at the other two angles. This means that the strongest chroma for any hue is always found horizontally opposite, and farthest out from, the midpoint of the vertical white-black-grey axis. Moving up vertically we find lighter values; moving down, darker. Moving horizontally out from the vertical axis, chroma increases.

Twenty-four Ostwald hues are arranged in counterclockwise order of spectrum, and numbered in clockwise order, beginning with yellow. 1 is yellow, 7 is red, 13 is blue, 19 is green. Intervening numbers indicate intermediate hues. Thus 2 and 3 are yellows with increasingly more red in them; 4, 5, and 6, oranges, increasing progressively in redness; 20 and 21, greens, containing small amounts of yellow; 24 is yellow green, approaching yellow itself, etc. In notation, hue number comes first followed by the white-black coordinate. Red at full chroma would be 7 *pa*; pale blue, 13 *ca*; dark yellow-green, 24 *pn*. The profiles of all Ostwald charts are the same, and when we combine them to make the color-solid it turns out to be a double cone with hues reaching full chroma at the equator.

A third type of color system is called a *colorant-mixture,* or *gamut* system. It is set up, like the Ostwald, in terms of percentages of black, white and various hues. But instead of *additive* mixture of colors, pigments themselves are combined in *subtractive* mixture (*subtractive,* because red or other pigments mixed with white absorbs or *subtracts* some of the light which was reflected the white alone). This is the oldest type of color system, and is really the recipe method of the old master systematized and expanded to take in the range of modern pigments.

Like the old master's approach, it works well if uniformity



Color-solid. One way of showing the irregular shape of the Munsell color-solid. It is also sometimes shown as a tree with branches for each hue.

of pigments is maintained. Paint companies, who *can* maintain pigment uniformity, use such systems regularly, because they are the best way to run the gamut of all possible tints, tones and shades which can be made from a set of stock pigments.

Charts usually resemble Ostwald's, with a page for the gamut of variations for each hue. Hues themselves are described by name or number, together with percentage recipes for those which are mixtures. Tints, tones and shades are indicated as percentages of mixed black or white, or by other convenient arbitrary notation.

Which is Best?

There is no point to arguing whether the Munsell, the Ostwald, or some other system is better. All workable systems provide some kind of accurate color language. Choice of a system depends on its intended use. A *color appearance* or *color space* system is probably best where color as *seen* is most important. We could use it to file color samples, to record color of past production, to poll consumer preferences, or to describe a hypothetical color of which no samples are available.

A *color mixture* system helps most where color as *made* is important. It helps in calculating mixtures where samples already exist. Based on *additive mixture*, it prevents errors due to possible differences in pigments, dyes or other colorants. And, of course, a colorant-mixture system is excellent where the materials are standard and controlled.

The Tuning-fork of Colorimetry

We can call a specific red Munsell 6R 5/10, or a particular blue Ostwald 13 ca, just as the musician can call a certain note middle C. But middle C has no meaning when our piano is out of tune. Science has helped the musician by defining middle C as a vibration of a definite wave length, and devising a tuning-fork. How do we keep a color system in tune? How do we say which color is what to begin with?

The science of Colorimetry helps us here. It studies and records physical color-data and treats them in ways which makes the results apply to color, as we see and use it in practice. Instruments like the photospectrometer and the colorimeter provide this data in the form of the wave length of light, and of reflection or transmission factors. Color standards based on quantities of these two factors never change.

Each color in the spectrum has a definite wave length. Reds, for example, go from 610 to 700 millimicrons. Violets have wave lengths of 400-450 millimicrons. (25,000 millimicrons to the inch.) Actual samples, of course, do not reflect absolutely pure spectral light. Cardinal red, for example, would reflect small amounts of other wave lengths and a large amount of wave length from 610 and 700 millimicrons. The maximum amount is located at a definite point. For cardinal, 617 millimicrons is called the dominant wave length (hue).

Brightness (value) can be measured by comparing the amount of light of all wave lengths reflected by a sample, with the amount of light reflected by a standard white (magnesium oxide is generally used). Light from the magnesium sample is 100% brightness and all other values are stated in percentages.

Under a white light, a given color reflects light of its dominant wave length plus a certain amount of white. The relative amount of the dominant wave length is stated as a percentage of purity (chroma). A pure spectral hue has 100% purity.

For all measurements a standard illuminant must be used, the most common being ICI Standard Illuminant C, produced by a tungsten lamp with a prescribed filter, and operated at a prescribed temperature.

We can now call cardinal red a color which, under illuminant C, has a dominant wave length of 617 millimicrons, a brightness of 9% and a purity of 55%. We have a *tuning-fork* for the hue, value and chroma of our sample.

Some of the Applications

Color systems are important mainly as a standard for understanding and talking about color in precise terms. The color engineer keeps the charts we have been describing on his shelf for *reference*, not on his desk for constant use. Once actual samples have been developed and standardized it is quicker to use *them* in working specifications, checking them occasionally to be sure they have not altered or faded.

Mechanical devices of many sorts have been developed to aid

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STEPS IN HISTORY OF COLOR SCIENCE

Scientists, philosophers, musicians and poets, as well as artists, have explored the problems. Each has made a contribution. This summary shows who some of the most important figures were and what each contributed to our present knowledge of color as a science.

1642-1727	Sir Isaac Newton	Scientist	Anaylsis of light
1723-1762	Johann Tobias Mayer	Astronomer	Three-color triangle
1728-1777	J. H. Lambert	Physicist	Color pyramid
1749-1823	Johann Wolfgang von Goethe	Poet	Relation of complementary colors to after-image
1773-1829	Thomas Young	Physicist	Three-receptor hypothesis of vision
1777-1810	Philip O. Runge	Painter	Color sphere with white at the north pole, black at the south, and with purest colors at the equator
1786-1889	M. E. Chevreul	Chemist	The color hemisphere
1788-1860	Arthur Schopenhauer	Philosopher	Description of color as a sensation
1801-1887	G. T. Fechner	Psychophysicist	The Weber-Fechner law (Relation of stimulus and sensation in mathematical terms)
1821-1894	Hermann von Helmholtz	Mathematician	Determined four unique complementary colors
1831-1879	James Clerk Maxwell	Physicist	Electromagnetic theory of light; technique of disc mixture
1834-1918	Ewald Hering	Physiologist	Derived all intermediate colors by graded mixture of the complementaries with black and white.

XUM

in mixing and matching. Some of them also aid in transmission. A description of one, the Ketcham color-code apparatus, shows how they work.

Let's go back to Paris where you have a fabric color problem, but this time you have a Ketcham color-code apparatus with you.

You have a set of 100 carefully selected colored discs. Each disc is numbered from 1 to 100. Disc #3 is red 6/10, disc #18 is yellow 8/12, and so on. Each disc has a hole in the center and a slot running from the center to the circumference. When two discs are placed on a spindle, part of the lower disc can be passed through the slot in the upper one, exposing sections of both. Two or more colors, combined in this way, can be mixed by spinning. Proportions of each color can be determined by adjusting the sizes of the sections.

The color you have in mind does not match any of your discs, but you know it is an orange lying between red, disc #3, and yellow, disc #18. Your apparatus is a box with a rotating calibrated scale inside. You fit your red and yellow discs together and place them on the scale. They are lighted by a source inside the box, which passes through an adjustable screen made of sections of diffusing colored glass filters. By adjusting a rheostat you control the *light intensity*. To avoid extraneous surface reflections, the light is located to fall on your discs at an angle of about 45°.

You spin your discs, looking at them through a sighting tube in the box, whose opening is shaped to give you the best view for accurate mixing and matching. You adjust the relative sizes of the red and yellow sections until they blend to give the particular orange of your fabric color. Marks on the calibrated dial measure the areas of the red and yellow sections, and numbers on the dial give percentages for each.

You record this information in the form: disc #3 — 40%, disc #18 — 60%. You cable the numbers to your home office, who set it up on *their* color-code apparatus. In a few minutes you can be sure that you and they are looking at exactly the *same color* under the *same conditions of light*.

Your dye manufacturer can test his match by placing a slightly larger disc of his sample underneath the combined discs #3 and #18, so that the sample makes a border. If the match is exact, spinning will make the sample border fuse with the color-code discs and disappear.

Using the Ketcham color-code machine, the first transmissions of exact color by cable, phone and radio were sent from Europe to America in 1936. In spring 1938 American Silk Mills tried the method, expressed astonishment — "The speed with which the Paris colors reached New York was just as much a revelation to us as the incredible accuracy in color matching. By the use of a color-code machine in our dye works we were able to be a full week ahead." Actual samples were sent over to verify the accuracy of the match. Color-code has been used by more than fifty leading department stores, including Bonwit Teller, Marshall Field and Neiman Marcus.

Samples which match under one kind of light may not match under other illumination, especially if they are made from different materials, as when a dye is matched to a paint sample. They should, therefore, be matched under the same type of illuminant as will light them in actual use. Also, the operator of the machine should wear a neutral grey so that clothing colors will not tend to reflect from and alter the appearance of the rotating discs.

The only way to get two samples which match under all conditions of light is to make them from the same pigments, or from combined materials whose individual light reflecting properties have been ascertained in the colorimetry lab.

CHART TO ILLUSTRATE HUE CHANGES

possible in various colors

Colors Can be Made:	Bluer	Redder	Greener	More Orange	Yellower	Browner
GREYS				X		
BLUES				X		X
GREENS		X				
MAROONS			X			
REDS			X			
BROWNS						
ORANGES	X		X			
YELLOWS	X					

X — No modification possible.

A Language, Not a Magical Formula

In our discussion, we have stuck to color systems as a language, and with reason. The idea that color systems hold the key to creating harmonies or entire color schemes is apt to be misleading. Like the notes, scales, clefs, the staff and other musical notations, color systems are a language for talking about and writing down harmonies, not for inventing them.

Harmony in color may be defined for practical purposes as that which, through the eye, delights the human spirit. It follows that the most scientific instrument to measure it is the eye of a supremely sensitive human being. Beauty itself and even the lowest common denominator of public taste elude the slide-rule. Henri Matisse, one of the greatest of modern colorists, said: "My choice of colors does not rest on any scientific theory; it is based on observation, on feeling, on the very nature of each experience."

Time spent drawing lines between various points on a color wheel, or computing the area versus saturation, might better be spent in museums and galleries where, by association with the masters of color, a sense of harmony may be developed.

The public's ever-changing preferences and reactions must be constantly studied. A color system might help us to calculate a pleasing combination, using yellow and green. It will not tell us that such a combination used on aircraft interiors will make a certain number of passengers airsick!

As we have said, lighting changes the appearance of colors; so do the colors next to them, and the backgrounds against which they appear.

Again, Matisse tells us: "I put down a red which satisfies me; immediately a relation is established between this red and the white of the canvas. If I put in a green near the red, if I paint in a yellow floor, there must still be between this green, this yellow, and the white of the canvas a relation that will be satisfactory to me" — and the struggle goes on until: "it would be impossible for me to add another stroke to my picture without having to paint it all over again."

The trained designer or color specialist is forever widening his knowledge of harmony under practical conditions. He keeps abreast of what the public wants. He studies dirt-resistance and wearing quality of colors and materials. He translates these things into color plans which will *work*, economy-, sales- and maintenance-wise. Color systems are part of his experience, but he is likely to attack his problems with color systems *behind* him, not in front of him. *END*

A FABRICS QUIZ . . . TO AMUSE AND INFORM

On each line of the quiz below one of the four terms does not belong with the other three. Check the term that you think is incorrect in each case and refer to the section below where the answers and proper definitions are given. Score 4 points in the left-hand space for each word correctly checked. 64 passes; 74 is fair; over 84 is excellent.

*1.*_____	Fuji	Luana	Oxford	Faille
*2.*_____	Donegal	Tweed	Cheviot	Herringbone
*3.*_____	Ottoman	Bengaline	Gabardine	Grosgrain
*4.*_____	Whipcord	Serge	Tricotine	Gabardine
*5.*_____	Harris	Manx	Tackle twill	Scotch
*6.*_____	Taffeta	Muslin	Percale	Marquisette
*7.*_____	Mignonette	Tricotine	Tricolette	Milanese
*8.*_____	Sarelon	Viscose	Acetate	Cuprammonium
*9.*_____	Faille	Shantung	Taffeta	Bedford cord
*10.*_____	Lappet	Clipspot	Doup	Swivel
*11.*_____	Discharge	Cross	Resist	Duplex
*12.*_____	Voile	Flannel	Cambric	Organdy
*13.*_____	840	112	128	140
*14.*_____	Chalk	Glen	Pin	Banjo
*15.*_____	Plain	Basket	Twill	Satin
*16.*_____	Shearing	Gigging	Brushing	Napping
*17.*_____	Gassed	Sized	Starched	Weighted
*18.*_____	Kersey	Melton	Domett	Beaver
*19.*_____	Vicuna	Sisal	Henequen	Kapok
*20.*_____	Brocade	Damask	Frenchback	Brocatelle
*21.*_____	Covert	Elastique	Bannockburn	Cavalry twill
*22.*_____	Rajah	Shantung	Punjab	Matelassé
*23.*_____	Bouclé	Poodle dog	Ratine	Shetland
*24.*_____	Madras	Sharkskin	Oxford	Chambray
*25.*_____	Duvetyn	Canton	Sand	Georgette

Identification of Quiz Words

1. Oxford is a cotton shirting noted for its bulky filling; other fabrics are identified by their cross rib line in filling direction. *2.* All are tweeds, but *Donegal* is made with plain weave while the other three are made in twill construction. *3. Gabardine* is made with twill weave; the others are known for their heavy rib line in direction of filling. *4. Tricotine* has a double diagonal line on the face of the goods; other fabrics have single diagonal line on face. *5. Tackle twill* is made from twill weave; other three cloths are tweeds. *6. Marquisette* is made from leno or doup weave; other cloths use plain weave. *7. Tricotine* is a woven cloth; others are knit fabrics. *8. Sarelon* is a peanut protein fiber; others are cellulose fibers. *9. Bedford cord* has corded or ribbed effect in vertical or lengthwise direction; other fabrics have cylindrical filling yarn effect. *10. Doup* or leno has to be made with two types of heddles — standard and skeleton; this is not true of the others. *11. Cross* refers to cross-dyeing; others are printing methods. *12. Flannel* is a napped fabric; others are not. *13. 840* is the number of yards in one pound of a No. 1s cotton yarn; the other figures are used to designate the total ends and picks per inch in sheeting. *14. Glen* refers to a Glen plaid; other three terms refer to types of stripes in materials. *15. Basket* is not one of the three basic weaves; the three basic weaves are plain, twill and satin. *16. Shearing* evens off nap on fabrics; the three other terms imply raised fiber to form a nap. *17. Gassed* fabric is one which has had fuzzy or protruding fibers removed by singeing; the other three terms imply weight added to material. *18. Domett* is a type of cotton flannel; the other three fabrics are woolen face-finished materials, heavy in weight. *19. Vicuna* is the most expensive textile fiber of all — a hair or specialty fiber; the other three are vegetable fibers. *20. Frenchback* is a backed fabric usually of worsted face and cotton back; the other fabrics are decorative materials made on a Jacquard loom. *21. Bannockburn* is a mottled-effect woolen similar to a tweed; the other fabrics are made with a twill weave in which the diagonal effect on the face of the goods is easily discernible. *22. Matelassé* is a fabric with a quilted or puffed surface-effect; the other cloths are lightweight dressgoods materials made of silk, rayon or acetate. *23. Shetland* is a woolen cloth made usually in twill weave; the others are fabrics identified by their characteristic face-effect which is curly or rough. *24. Sharkskin* originally was made of worsted yarn and is now also made of acetate yarn; the other three cloths are shirting fabrics. *25. Duvetyn* is a women's wear coating fabric, soft and appealing in hand; the other three cloths refer to types of crepe fabric.

COLOR LOADING

BY NELSON ROSENBERG

The author has concerned himself over a number of years with basic research on problems of color as they apply to color users, rather than to scientists or technologists. The following article on color loading is one of the results of his study. Though many artists and colorists have used this method of improving color, it has been usually done intuitively. This is possibly the first instance of an actual, written description of the method which the reader will find readily comprehensible.

— THE EDITORS

IT IS THE AIM of every colorist to create tones that are lively and intriguing. If he is worth his salt, he will not be satisfied to mix just a brown or a green. He wants a brown or a green which, even though it may be dull, is subtly and skillfully toned for attention.

His models in this matter are many: they are the tones of life and of art . . . a zinnia, an apple, the girl with auburn hair walking serenely down the street . . . the pearly gray of waterfront mist, the bay and russet mounts of the riders in the Park . . . the soft weather-toned facades of the older skyscrapers rising in the frosty air . . . tones soft and tones bright, yet somehow pleasing, somehow not harsh, somehow still rich.

Rembrandt, Titian, Delacroix, Cezanne, Degas and Braque — their tones all partake of this lively quality that we recognize instinctively, this quality of richness, whether the color be vivid or restrained.

One of the most important ways to achieve this quality of color is by a method to which we might apply the term *loading.*

Loading is the adding of extra colors to a tone to produce a glowing effect; that is, we use more colors than we actually need to make the tone.

An advertisement for a new face powder will give us a good idea of what loaded color is, and how to make it. This ad proudly proclaims that a new shade has been carefully and laboriously blended from ten colors. Notice that . . . ten colors to make one tone, a loaded tone. It is in sharp contrast to the days when all face powder without exception was pink. Today, cosmetic makers have acquired subtlety.

What happens when ten shades of powder are used to make one is that the color acquires a richness, a compound quality, that is more appealing by far than just pink.

* * *

There is no mystery about this process. You don't have to be a prodigy or a born colorist to use it. All you have to do is to add a little extra something to your color mixtures, in this wise: Let us say you are painting a portrait, or mixing a new tone for your living room walls.

In your portrait, the flesh tone will present the same problem as the face powder. Load the flesh tones, and you get more richness and sparkle, even in the deep shadows. If you want to verify this, make a flesh tone, first, of vermilion red and white. Then try one of yellow ochre, vermilion and white as the main

tone, with traces of rose madder, raw umber and raw sienna added at your own pleasure. Note the difference. Richness is often better obtained with six elements than with two.

In mixing the color for your living room wall, make a subtle yet singing tone, and watch as others try to duplicate it. They will invariably try to duplicate your pale yellow with white and yellow alone, not knowing that you (as do the best decorators) added to the two main colors additional traces of umber, sienna, green or rose. Infinitesimal and unseen, these tones are yet helpful. They make all the difference, but the viewer cannot tell why your yellow is so much richer.

The case for loaded color was perhaps stated best by Robert Henri. He says, "At times secreted in the appearance of a simple tone there is a gamut of color, shifting across the spectrum, which keeps the thing alive, illusive, and at the same time creates the mystery of depth."

There are those who will object to this idea. "Why do I have to add an extra color when it's already green?" they will ask. They cannot at first accept the logic of the thing, of putting colors into a tone that don't even show. The answer to their question is this: loading a tone adds complexity and interest; none of the colors you put in is lost, but the tiny points of color as blended by the eye create a tone like the variegated threads of a tapestry or the handsome stuffs of woven wool in which strands of many colors combine to create one rich color when you view it from a little distance. It is, in short, the impressionist effect of broken color, but very much in miniature.

Loading removes the curse of being *ordinary* from colors. It keeps people from saying, that's just a plain, uninteresting red, or a plain yellow or blue, as the case may be. At the same time, the colors can be kept bright and clear.

The khaki of army uniforms is an interesing example of the use of loading. The basic tone of khaki is a blackened yellow, but dyers often must use ten different tones of dye to get the exact effect of khaki they want.

The very brilliance of dyes produces an additional need for loading, to soften over-bright colors. It must be remembered, though, that loading is not primarily for softening tones, but for making them richer.

In French art schools, a common admonition of the instructors, echoing Titian, is, "Muddy your colors — they will then become *plus distingué*" — more distinguished. What they mean, really, is to load colors, not muddy them.

* * *

SIMILAR TONES can be mixed for loading. Two different greens mixed together will give a compound richness. Orange and red and red-violet will blend to form a warm rich tone. Turquoise and ultramarine blue mix to give a surprising blue.

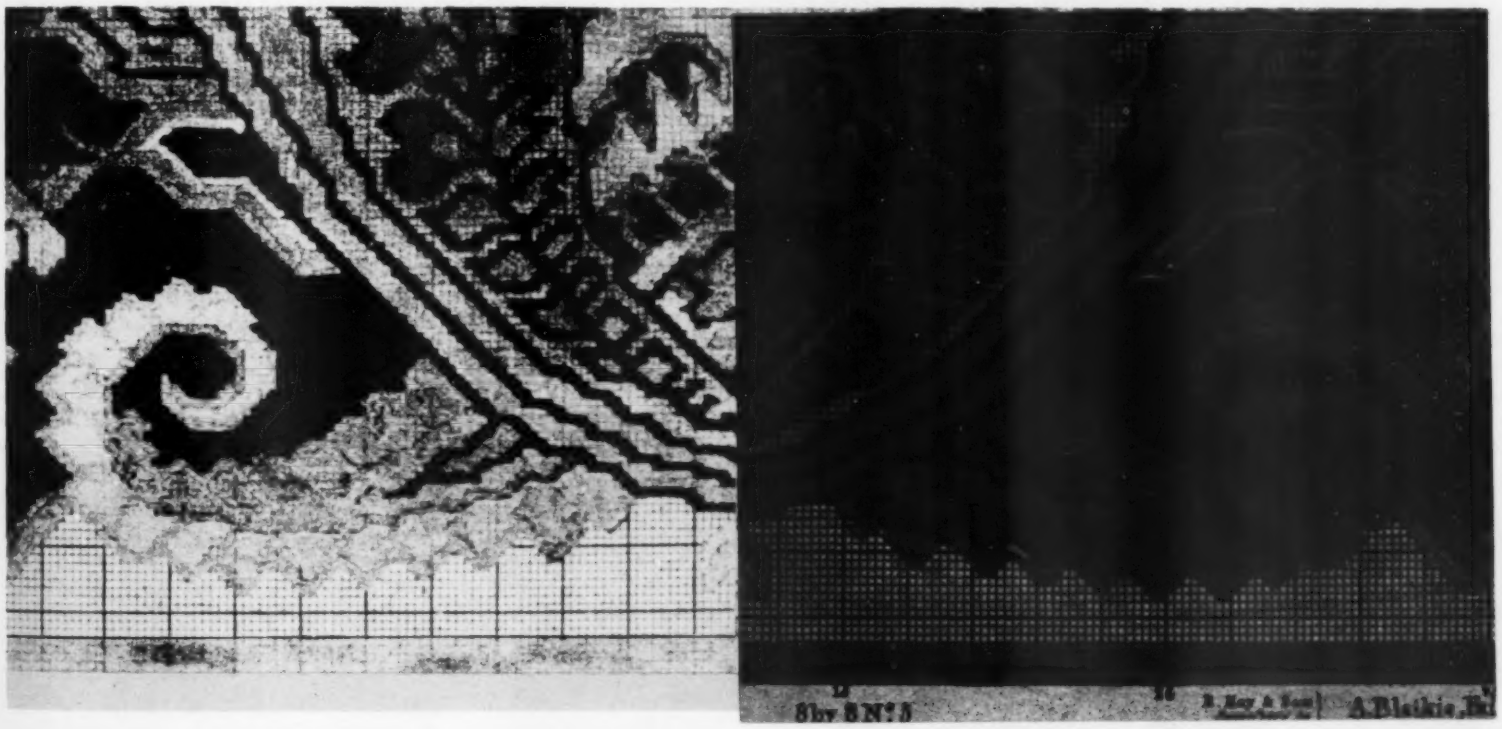
OPPOSED TONES can be mixed for loading. Warms and cools together like green, yellow, sienna and a touch of rose will give the green of a leaf, dull yet pleasing. The warm colors — yellow ochre, burnt sienna and orange — mixed with the cool colors — ultramarine, cerulean and terre verte — give a rich, loaded neutral. Violet and orange combine to form a rich and warm yet dull tone.

A tiny bit of orange or yellow added to alizarin is often the only difference between a vibrant, appealing rose and a harsh, uninteresting one.

It must be remembered, though, to keep loading in mind but not to use it mechanically or invariably or too much. Loading is a *sometimes* thing. Colors can be used pure, or they can be loaded, or they can be reinforced (very lightly loaded). You can forget loading for a while, and see where it is really necessary or where it can be dispensed with.

LOADING WITH GREY. It must not be imagined that loading is always done with bright tones. One of the most successful ways of loading is to use grey. When the grey is used in tiny amounts it is not definitely seen as a part of the color, it exerts almost a subconscious effect. (Try adding light grey to a rose that has been toned with ochre.) But in larger amounts, grey produces that interesting family of colors we know as the *dusty* colors.

A vibration similar to the effect of loading is achieved by the particular texture. When a wool blanket is dyed, for example, the fuzziness gives life to the color, due to the vibration of light and shade on individual fibers. Similar in effect to this is the powdery surface of flowers, and of pastels. In point of fact, this vibration actually consists of a loading with grey, since the shadow of each fiber is a grey tone, which is distributed all over the surface of the fabric.



LOADING IN TECHNICOLOR. An additional insight into the process

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of loading is to be had by examining a corollary medium. It may be wondered how Technicolor, which uses pure bright primary tones of yellow, cyan and magenta, gets subtle loaded tones. It works like this: A flesh tone in Technicolor will be a pale film of yellow, superimposed over a pale pink, with hints of blue and grey additions, depending on the shade of the flesh and the degree of shadow.

A similar effect takes place in the four-color printing process. There is a slightly different problem here, since dye on opaque paper is not so brilliant as dye on transparent film. The loading is partly due to overlaid inks, partly to the loading effect of the half-tone dots of color, á la Impressionism. A flesh tone here would consist of tiny dots of yellow, red, and some blue and black dots.

HANDLING. There are various and sundry ways of handling loading. A loaded dye tone may be made up before a fabric is to be dyed, or the fabric may be dyed repeatedly in various tones. This corresponds to the painter's use of color. The color might be mixed thoroughly on his palette, before his brush ever touches canvas, as many artists do it; or he might mix color on his canvas while painting, as Van Gogh did; or apply layer after layer of glaze over his undercoats, as Titian did. "How many glazes?" Titian was asked. "Oh, trenta o quaranta."

For simple loaded tones, try making a green of ochre and blue, for a change, rather than yellow and blue; or even orange and blue; or umber and blue; anything aside from the usual mixtures. Rather than a pure orange, now and then use a tile orange, made of burnt sienna and yellow; or a deep loaded rose of alizarin and orange and a touch of purple, rather than an ordinary red; or an ochred tan rather than a yellow.

REINFORCING. When colors are only slightly loaded, we might use the term *reinforced* to describe them; thus, a vermilion reinforced with only a slight trace of alizarin; or a viridian reinforced with a little lemon yellow (or raw sienna); or a lobster composed of scarlet with traces of white and gold; or a red gold of yellow with a trace of burnt sienna.

* * *

Of all known types of loading, perhaps the subtlest and most nearly perfect are those of certain kinds of flowers. In a test of a hundred or so flower tones, I found the vast majority to be reinforced or loaded tones. Even those which seemed to be pure tones were actually capable of being reproduced only by a process of loading. There is a definite reason for this, based on spectrographic analysis, but that is another topic. Suffice it to say that flowers offer our most exquisite models of this sort of color. Of course, even among flowers there are some whose color has its shortcomings.

Open your eyes, look around, and the universe of loading becomes plainly visible everywhere. The brown of earth, the red of brick, the weather-beaten wood fence, Dürer's portrait of himself as a young man, all proclaim the enormous range of possibilities inherent in the technique of loading. As to the opposite, there come to mind a box of soda crackers, a can of corned beef — unloaded or poorly-loaded tones done by printers who did not take the time to compound better ones — or the well-known calendar artist whose vivid blue skies and oceans are startling, but which would be improved by a little loading. His ultramarine and cerulean skies would gain added richness with a trace of burnt sienna, perhaps, losing nothing of their effect in the process.

Looking out the window, I see twilight descending — a magical time that adds a modicum of loading to all tones of the landscape in unison, and increases as it deepens — till the trees, and the cars, and the shocking pink coat of the girl across the way all become touched with a softer richness.

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American Viscose

bringing more people luxury and plenty

undreamed of

since the world began . . .

MORE LUXURY FOR MORE PEOPLE

American Viscose

It nurtured a development which was two centuries in the making and in twenty years produced a giant of the modern world.

THE UNITED STATES DEPARTMENT of Commerce defines *rayon* as "man-made textile fibers and filaments composed of regenerated cellulose and yarn, thread, or textile fabrics made of such fibers and filaments."

This may rank as a remarkable scientific understatement, for the making of rayon and other viscose products makes a major contribution, increasing yearly, to the American way of life. Directly and by implication it affects the social and economic welfare of almost every American today.

It is difficult to imagine living in a world without rayon. This versatile fabric is worn for work, for play; we sleep in it; we use it to beautify our homes; and by means of it we even travel, for the cords of many tires are made of high strength rayon.

While this miracle fabric is only forty-two years old, it was first dreamed of and documented in 1664 by Robert Hooke, an English scientist. Hooke's principles were drawn a step nearer practicality by René de Réaumur in 1742. This famous French scientist suggested that an artificial fiber might be formed from gums and resins drawn into fine threads. But neither the chemistry nor the equipment of those times permitted application of the basic idea. It was nearly 150 years later that another French scientist, Count Hilaire de Chardonnet, approached the problem in a systematic manner and was able to produce fabric of synthetic yarns. In 1891 he built a plant for commercial production of yarn by the cellulose nitrate process.

The next vital step in the production of rayon was the discovery of the viscose process by two English chemists, Charles F. Cross and E. J. Bevan. Working together, they discovered that cellulose, when treated with disulphide of carbon in the presence of caustic soda, was converted into a golden yellow plastic compound, soluble in water. A solution of this plastic was of such viscosity that the name *viscose* was given to it, and the discovery was soon to grow into the largest and most widely used commercial method of making rayon yarns.

Early Rayons

The establishment of the first commercial rayon producing unit took place at Marcus Hook in 1910 under the title of the American Viscose Company, now the American Viscose Corp.

Up until 1924 synthetic fabrics were known as *artificial silks*. But since they had properties and uses far different from, and in instances superior to, silk a new name for these fabrics became imperative. The National Retail Dry Goods Association appointed a committee to select an appropriate name. The word *rayon* was chosen.

Early rayons were limited to showy fabrics which could be produced only in high luster. In 1926 the American Viscose Company developed the first dull viscose yarn and immediately the fabric world went to town on new end products.

Further experimenting permitted a variety of degrees of luster, ranging from gleaming satins to dull finished broadcloths. A year later another step forward was made when a method for crimping viscose yarns into high-twist crepe fabrics was invented. In the same year high tenacity or high strength rayon yarns were placed on the market. Their manufacture was made possible by a special method of spinning developed by Avisco. In this method the rayon yarn is stretched during spinning, making for higher strength yarns suited to additional types of products.

In the 1930's the development of rayon staple took place. Soon rayon staple was available in a wide range of lusters, filament sizes and staple lengths, making it possible to create fabrics of great diversification. Rayon staple (from which spun rayon is made) is manufactured in the same way as filament rayon except that the filaments, after they leave the spinneret, are cut to definite lengths as required for different types of fabrics.

Until 1941, the majority capital stock interest in American Viscose Corporation was held by the British parent company, Courtaulds Ltd. Transferred at that date to American hands, the industry developed in response to wartime defense requirements. Released from war production limitations, its impact on the American textile economy has been staggering. By 1950 the sales were grossing over 267 million dollars per year, with net earnings of over 33 million. In accordance with a conservative tradition and outlook, however, almost half of this sum was set aside for plant expansion, which will bring its own benefits as the market for viscose rayon continues to expand.

It may be here mentioned that in recognition of the predominant place that viscose rayon has assumed in the world of man-made fibers, it has recently been ruled by the Federal Trade Commission that the name rayon in future will be used to designate viscose rayon only.

A Great Diversity of Application

Today, Avisco turns out everything from standard one denier rayon fiber to a 15 denier staple for carpets. Let us for a moment consider the former. The one denier staple, no larger than

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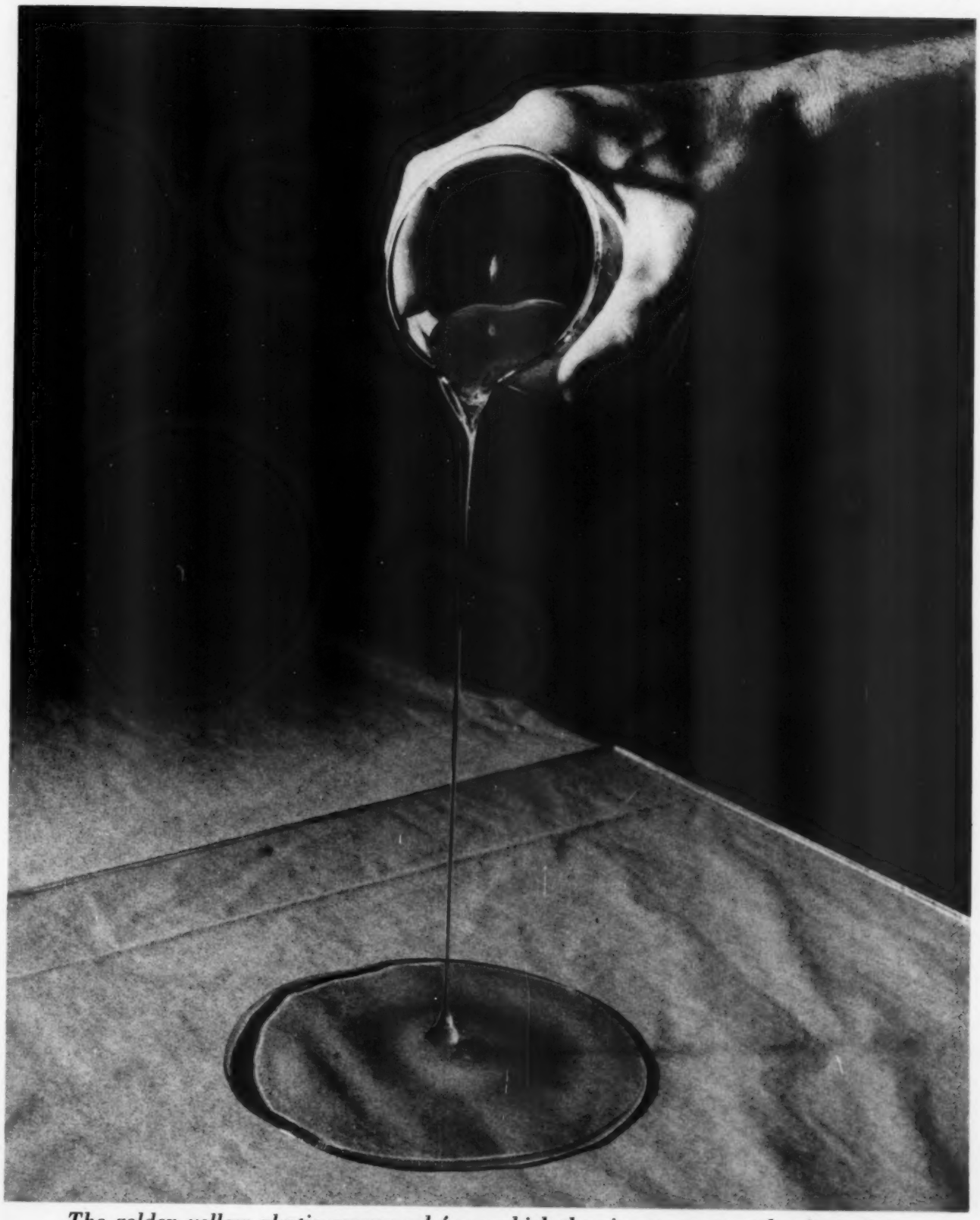


The golden yellow plastic compound from which the viscose process takes its name.

the gossamer filament of natural silk, has been called a miracle fiber. In fineness equaling the finest man-made fibers of any type, one denier staple made possible a whole new family of fabrics. It may be spun into yarns as fine as 100/1 cottons, to produce textiles of fine quality, soft to the touch. It offers new possibilities in the heavy yarns. These yarns possess added strength due to the great number of fibers in the cross section.

On the other hand, 8 denier rayon staple, with its inherent crispness, makes for loftier, more springy fabrics. It is said to yield a finished fabric that approximates wool 58-60's. It fills a gap in the rayon staple line between 5½ denier, until recently the coarsest apparel staple fiber used, and the extra heavy fibers such as the 15 denier. This new 8 denier staple is for use in suitings, sweaters, bathmats, and in a host of upholstery and drapery fabrics. Blended with other fibers, it can be used in men's hosiery, slacks, suitings, blankets, hand-knit yarns, and terry cloth. Stiff, bristly effects are possible similar to those obtained with mohair and coarse apparel wools. It has been blended with satisfactory results in mohair frisé and plush fabrics. Another advantage of this staple is the fact that it can be spun on the cotton as well as the worsted and woolen systems.

The rug and carpet industry, seeking new hard wearing materials for floor coverings that have the beauty and utility of oriental silk and wool rugs, are turning eagerly to 15 denier rayon staples.

Industrial uses of rayon are becoming more and more important in solving production problems. For example, in 1936 when tire manufacturers were looking for a cord material which could withstand the punishment of high speed service, a new type of viscose fiber was developed which made tires that have proven, under billions of miles of road test, better to withstand shock and resist blowouts. Since tires using viscose rayon cords run cooler, they save wear and tear on the rubber. Rayon cords make it possible to use less rubber in the tire wall, at the same time creating a stronger and lighter weight tire. Top companies estimate that there is a saving of 670 pounds of rubber for every thousand pounds of extra strength rayon yarn used.

This type of fiber has made possible, too, the creation of the new large industrial conveyor belts. Rayon tow, used as packing, has been approved by the U. S. Navy.

Heavy rayon felts are now used for soundproofing and, on the other end of the scale, rayon is used for making the fragile mantles for kerosene lamps.

In the war production effort we find rayon used not only for tires, but for self sealing gasoline tanks, for many types of parachutes and for aviation clothing. The omnibus uses of this fiber are truly fantastic in scope.

Social Impact of Rayon

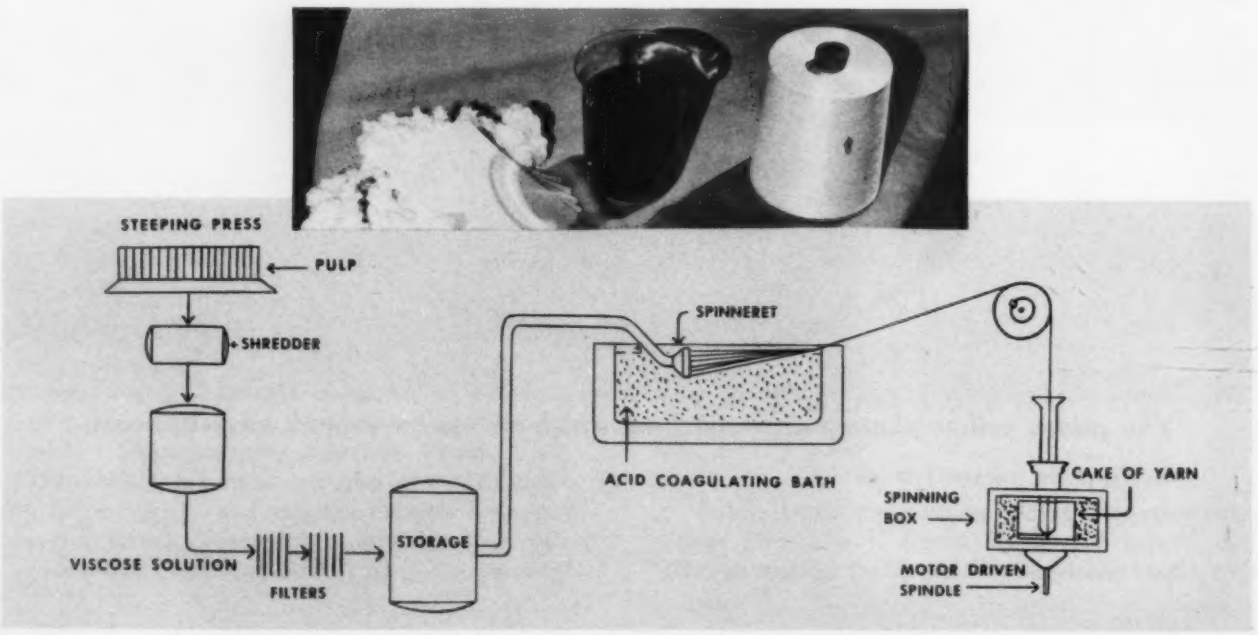
From a social standpoint, rayon has raised the standard of living, in respect to apparel, to unprecedented heights. Consider that not many years ago only a few women were able to afford a silk dress or silken underwear. Today silk is forced to imitate new weaves introduced in rayon fabrics because rayon has not only been put within reach, but has become the standard of every wage earner in America. Today it can be said that the Colonel's lady and Judy O'Grady are sisters right down to the skin! And with the use of rayon, into the mass markets have come new suitings—tropical weight fabrics in rayon with the characteristics of wool, at the prices of cotton—as well as shirt fabrics and knit goods and combination weaves for many purposes. These new fabrics have caused a social impact which has affected every country's standards and thinking. Rayon has made its way into our technical high schools and college systems, too, opening new fields of application in industrial chemistry and physics. Thousands of men and women have prepared themselves to follow interesting careers within the framework of a new industry. New fields of employment have been opened which, because they are independent of crop and weather hazards, have eased labor markets and assured greater security of jobs.

It has been predicted that by 1955 the domestic rayon industry will have achieved a capacity of 1,500 million pounds. This truly astronomical figure means that despite a growing population America will continue to hold her place as the best clothed, furnished and transported nation in the world.

Production of Rayon by the Viscose Process

The viscose process of rayon manufacture takes the form of processing natural cellulose, derived from wood pulp or cotton linters as raw material, by a series of chemical treatments. In this transformation, sheets of purified natural cellulose are converted into a solution and subsequently reconverted into a solid in the form of a fine filament without molecular or chemical degradation.

The basic operation of the process is shown by the accompany-



ing picture series. White sheets of bleached cellulose sulphate pulp, resembling large pieces of blotting paper, are steeped, after blending to ensure uniformity, in a solution of caustic soda. The resultant product is known as alkali cellulose.

After steeping, the sheets are crumbled by the revolving blades of a *pfleidering* machine, and stored in bins to undergo aging. With addition of carbon disulphate the crumbs turn a bright orange, at which point the product is known as *xanthate crumb*. This is ready for dissolving in a dilute solution of caustic soda.

The resulting product is a thick, honey colored liquid known as the viscose solution, from its physical character and sluggish flow. This has the property of hardening when passed through a dilute solution of sulphuric acid, which enables fine filaments, extruded through holes in a spinneret into a sulphuric acid bath, to be withdrawn, dried and skeined.

The filament now can be prepared in one of several ways—either by spinning as continuous filament yarn, or by cutting into staple of desired length or of mixed lengths, or by direct spinning, according to the type of fabric and end use in view; and it may be noted that according to the type of fabric desired, the staple may be spun on the woolen, worsted or cotton system, thus pointing to the universal character of rayon products.

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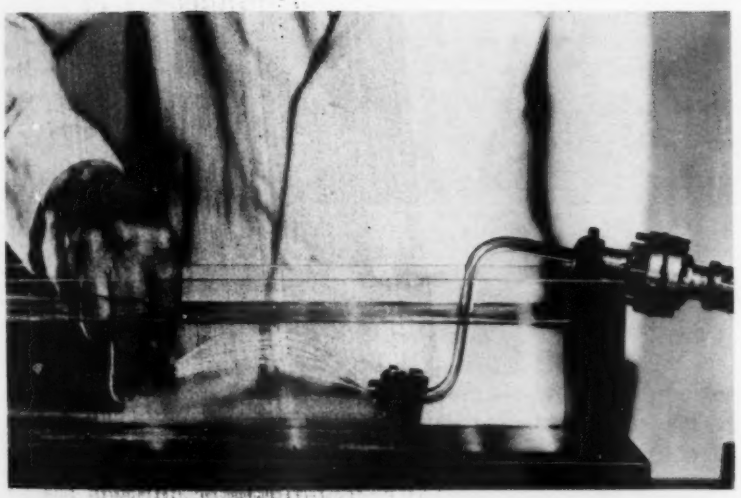
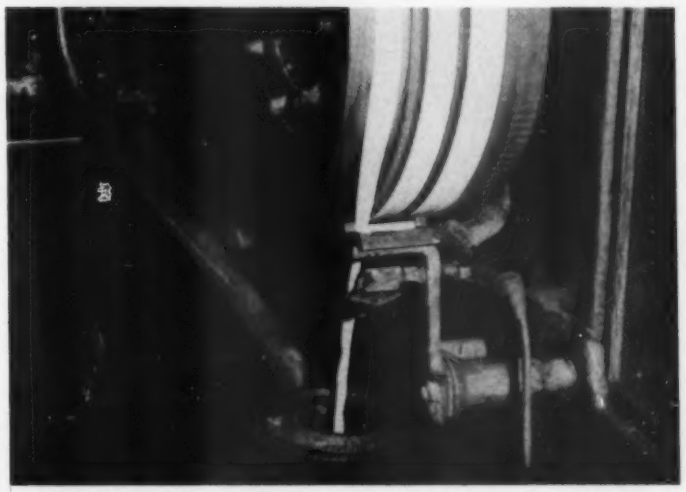
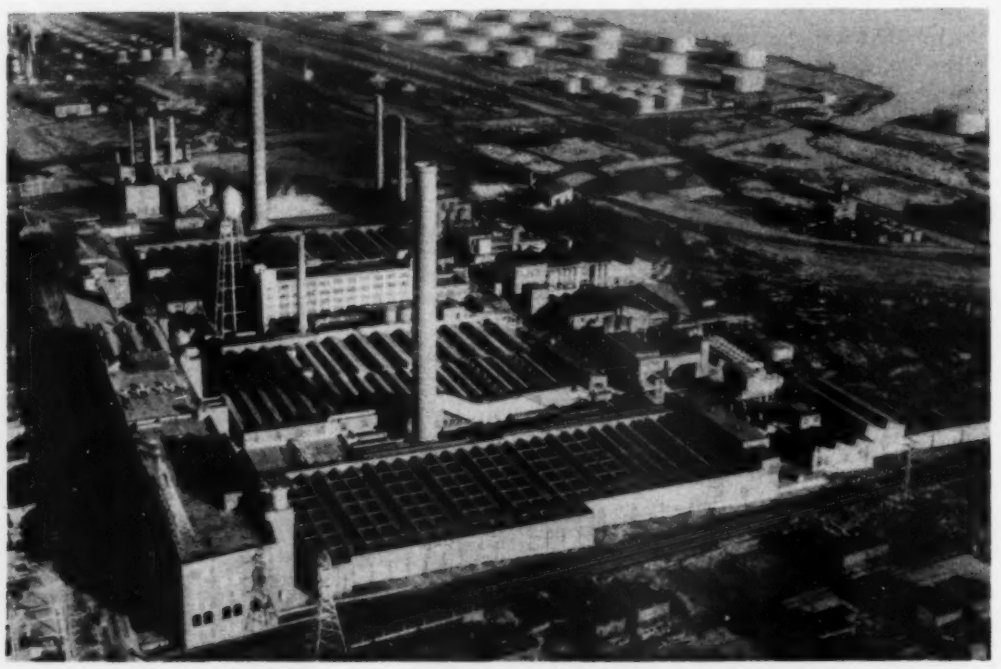
Xanthate crumb, the form in which the cellulose is prepared for solution in caustic soda, is transferred to the dissolving solution.



The viscose solution is pumped through minute holes in the spinneret and is coagulated upon extrusion into the acid spinning bath; these filaments are combined to form a yarn.



Above: the dry continuous filament yarn passes downward into the cutting box for conversion into staple. *Below:* the finished rayon staple.



T.R.D. . . . THE TEXTILE RESEARCH DEPARTMENT OF AMERICAN VISCOSE AT MARCUS HOOK, PA.

T.R.D. . . . an industry in miniature, it is one of the world's most remarkable examples of integrated activity in research.

THE INTRICACIES AND NEW HORIZONS in the viscose product field owe their development to an M. I. T. professor who left the technological institution in 1922 to organize the American Viscose Corporation's first formal research department at Marcus Hook, Pennsylvania.

The original laboratory contained space enough for only a few scientific workers. In 1939 the Textile Research Department was established which today has become an imposing establishment covering four acres and housing a truly fabulous array of facilities and a small army of finely equipped research workers. The Textile Research Department, or T. R. D., as it is now known, has reached a pivotal position in the rayon industry because in it meet almost all the threads of production, research and development in respect to all types of rayon application in the commercial and industrial fields.

Here, the visitor is struck by the human element in what we commonly think of as a cold blooded, unemotional industrial giant. The research staff at T. R. D. operates like a large family, mutually respectful of one another's abilities. The members have one common purpose—to turn the searchlight of truth on all operations which concern viscose and the improvement of viscose products wherever they may be finally manufactured.

* * *

At T. R. D. young men, fresh from their alma mater, are assigned to departments which represent the start of their careers in research. They are thoroughly grounded in basic methods in many fields of practical and scientific endeavors before they emerge as specialists, in some particular branch of the industry.

These trainees stay generally about eight years, and when they leave it is frequently for key positions in the industry. Thus, from the incubator of specialized knowledge and research, there emerges every year a group of full-fledged experts with a valuable overall first hand experience, hard to obtain elsewhere. Taken over the years, this constitutes one of T. R. D.'s most valuable contributions to the industry at large.

* * *

Scarcely less important is T. R. D.'s invention, control and release of new developments within the industry. This acts as a stabilizing factor in the fluctuations of business which are outside the industry's own control. When business is slack, research is continuous. New developments can then be favorably introduced, to stimulate interest and create sales, with the minimum of disruptive effect on the even flow of production. Thus many contributions of great potential value are stored by the research divisions for a time until they are demanded by the mills or by the consumer, and the greatest effect can be obtained from their release. In this way a factor of stability has been brought by research to the industry at large.

A further important general contribution to the industry made by the T. R. D. organization is the maintenance of quality standards. This affects only the products of the American Viscose Corporation directly, but because each week a sample of every

product is submitted to searching test, and because the T. R. D. has the power to order stoppage of production at any point where it falls below the rigid standards set, it acts for the benefit of the industry as a whole, thus maintaining and raising standards of rayon production to the highest possible industrial level set not by industry but by research.

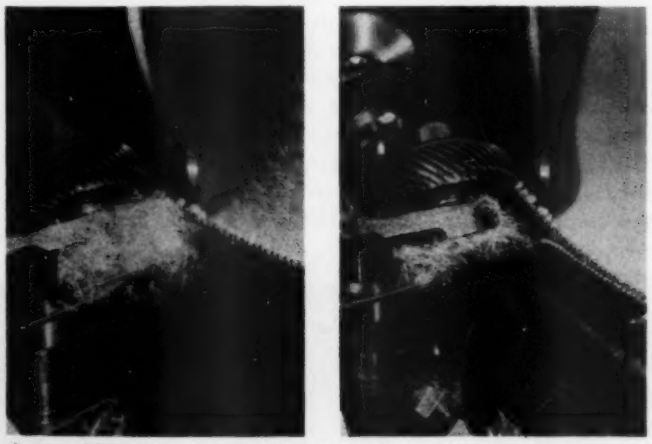
Close investigations are also made by T. R. D. of finished fabrics and other goods based on American Viscose production. Contact is maintained with mills using Avisco rayon yarns, the object being to assist in every sphere of technical development and quality control. Behind this contact stands the work of the different divisions of T. R. D. which has now reached a position of recognition within the industry.

Principal Research Services

The research divisions of Avisco are four closely integrated research services. The first is Product Research, which is concerned with producing new and better rayon fibers. The second is Fabric Development, which includes in its scope the creation of new fabrics from those fibers and from existing fiber types. The third, Textile Research, studies the practical problems of the commercial production of all fabrics containing rayon. The fourth, which is called the Converting Relations Department, encourages the suitable finishing of rayon fabrics, a field in which interchange of experience gained under research conditions with commercial operation practice is often of the highest value.

In order to explore the widest range of possibilities in these many sided fields, the T. R. D. contains full-size machinery for cotton, woolen and worsted system spinning, for warping and weaving, for circular, flat and warp knitting, for dyeing and finishing, and for industrial application of such products as rope, belting, flock and non-woven fabrics. It is probably the only organization in the world where machinery of six different textile mills as well as complete dyeing and finishing equipment are housed under one roof and used as one unit for every purpose of research and investigation.

This is why, for example, manufacturers of machinery are glad to install and maintain their equipment, often worth many thousands of dollars, free of charge in order to have the benefit of experimentation with every fiber or fiber combination and in conjunction with every type of process, in the T. R. D. plant. This



A test of T.R.D.'s Avcodisk lubricant. *Left:* Excessive accumulation of fly when knitting. *Right:* Minimum fly accumulation with lubricated yarn.

makes possible improvements in knowledge and practice which vindicate the investment which installation and upkeep represent. Such machinery under test represents not only domestic types, but often those manufactured by overseas industry in Europe and elsewhere.

The Chemical Research Division is an interesting entity on its own account. It is engaged in fundamental investigation of the properties of yarns and materials used in production of all the

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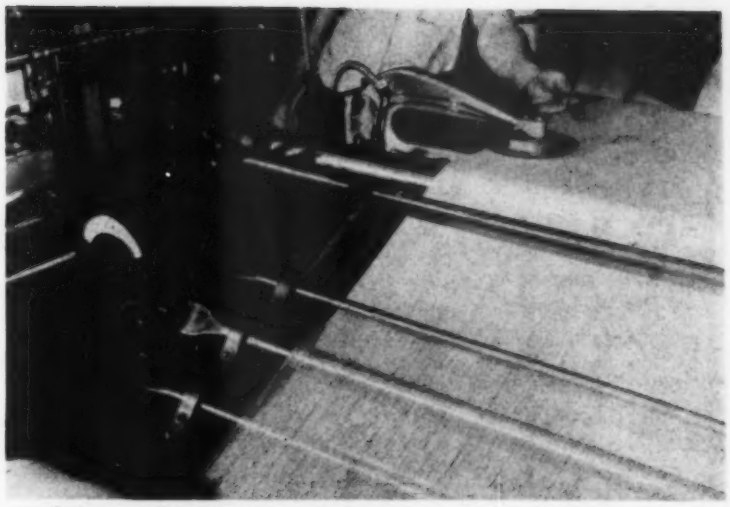


Only one of its kind in the U. S., this moisture recorder, based on an English design, continuously indicates the amount of moisture in slashed warps or in dyeing processes.

New in this country is the German *Perfect* spinning machine, with gear driven spindles which can be stopped separately. It occupies a third less space than conventional types.

THE AVCOSET PROCESS

Has Washable Rayon Arrived?

THE PHENOMENAL RISE of rayon as a volume fiber has, despite great consumer demand, been hitherto retarded because of its physical limitations during laundering processes. In the past this handicap necessarily curtailed its use in clothing categories where the upkeep of the garment (launderability) was a major factor in its final sale.

It is now claimed that this deterrent has finally and permanently been eliminated by Avcoset, the American Viscose Company's stabilizing process which is reputed to remedy progressive shrinkage from rayons and to render rayon completely washable.

The Avcoset process is entirely new in technological approach. Formerly, most types of stabilizers for rayons were developed from resins, which were applied as coatings to the fiber. Unless very skillfully handled, these had serious disadvantages. As an example, there was the inherent quality peculiar to resins which caused them to flake off in microscopic saw-toothed particles under the flexing of the finished cloth, thus setting up a constant abrasive action which ultimately damaged the fibers. The abrasion became especially noticeable in wear tests when such resin-type stabilizers were applied too heavily.

Solving the Problem

It therefore became necessary to do laboratory thinking along entirely new lines in order to produce 100 percent washable rayons . . . rayons that would have the same properties as sanforized cottons. After much experimentation and exhaustive testing, the Avcoset process was perfected.

Avcoset was revolutionary in conception, insofar as the basic operation departs radically from resin processes. The chemical involved is an alkali cellulosic formaldehyde, which is not deposited as a coating on the fiber. The molecules of the Avcoset formula actually act upon the pectin in the rayon fiber, changing the length of the molecular chain.

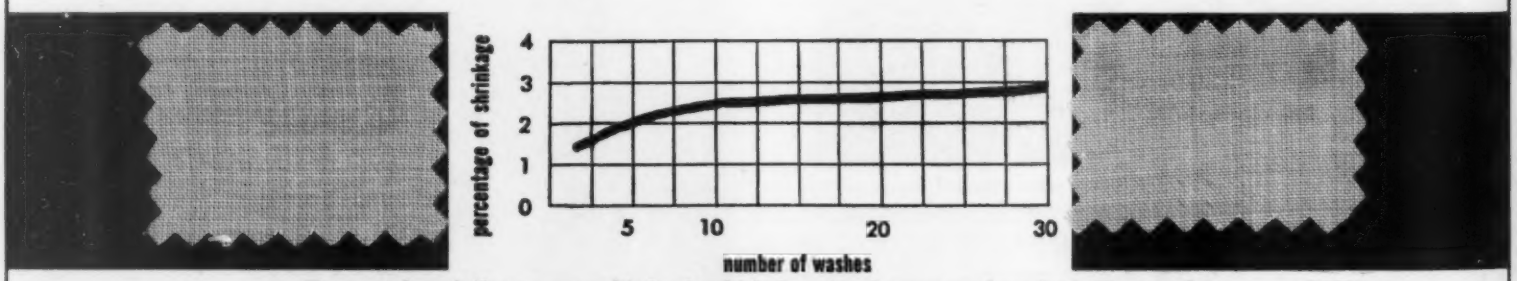
The end results of the Avcoset process are manifold. First, permanence of the stabilization is assured by the basic fiber change. Second, it eliminates the abrasive action of resins. Third, it makes rayon as washable as cotton and does not increase its weight more than 1% of the fabric weight. Fourth, it actually improves the structure of the fabric, because it makes a molecular change instead of adding new factors as a surface coating to the finished product. Fifth, it shows a complete absence of chlorine retention characteristics. And, equally important, the makers claim that the Avcoset finish is permanent in regard to cleaning and bleaching, as well as to laundering. Three years of exhaustive tests have been made which have proven this.

A Question of Timing

Avcoset was ready for commercial exploitation a long time ago, but the company held back production until every type of test could be applied and verified many times. As a result the claim has now been put forward that this new finish has complete washability . . . needing no special explanations, terms of apology, conditions or reservations.

If this be fact (and it must be assumed to be factually correct, since over a million yards of Avcoset rayon have been processed to date), then new and profitable horizons open up for the makers of sportswear, underwear, dress shirts, children's wear, draperies and other end products that renew themselves in the wash tubs.

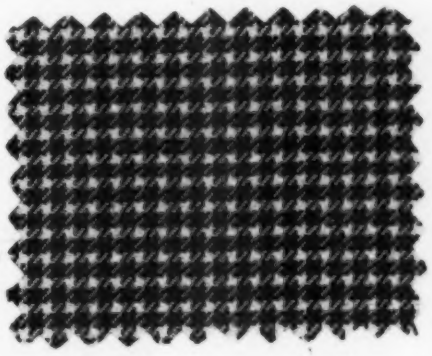
Particularly interesting is the fact that while the Avcoset treatment affects only the rayon fiber, this does not preclude its use for fabric blends containing nylon, acetate or other fibers. In all instances (tests involve fifty launderings under rigid laboratory checks) not only was the fabric not adversely affected, but the hand was improved as compared with unprocessed rayon.



Two swatches of all spun rayon shirting in which the colored yarns are dope dyed. The swatch at left has been processed with Avcoset and has received no further treatment. The swatch at right, from the same piece of goods, has been subjected to thirty complete launderings by a commercial laundry according to their standard colored cotton shirt formula, including drying and ironing in each laundering. The graph shows the progressive shrinkage percentage-wise.

AVISCO FABRIC DEVELOPMENT

Today's Lessons Make Tomorrow's Fabrics



Shepherd check of acetate and rayon by BURLINGTON MILLS

THAT THE END DICTATES THE MEANS is the underlying current that accelerates modern fabric development. New consumer demands, changing conditions in the trade, and the development of new style trends (which render previous trends obsolete) are all prime factors in developing an ever increasing soft goods business at all levels.

In many instances the burden of developing new types and textures of fabrics that suitably fit an approaching trend falls upon the maker of fibers and upon the wearers, for in a great number of fashions the basis of a style lies in the fabric itself. This has been notably true in the production of rayon fabrics. For many years the market has gone along with rayons developed in finer and finer filaments, which in turn were used to produce crepes and other types of soft handling textiles. This classification of rayon material was in mass demand. Because of this it was constantly improved until the most softly draping fabrics were able to be produced from finer denier filaments.

The Influence of Fashion

But then came a change!

First Paris, then American couture, innovated radical departure in the lines of feminine outerwear. Former soft, clinging lines developed into new silhouettes that jutted at provocative angles. The bouffant cut became an accepted designers' credo. Fashion-minded American women wanted this crisp, clean-cut look, and manufacturers determined to give it to them whatever the problems. But the effort of achieving this new look fell upon the makers and finishers of fabrics. The use of stiffener-accessories was frowned upon because of their unwieldiness and because of the additional cost involved. The loading of fabrics with resins and other heavy substances proved unsatisfactory under cleaning and dyeing processes.

So Avisco turned toward the engineering of new constructions of fabric that would have the desired stiffness built right into the material itself. This was accomplished by using coarser filaments . . . that is, filaments of greater diameter . . . which gave the woven product a degree of supple stiffness never before obtained, except by the use of heavy finishes.

Constant Adaptability

While this new development is the logical answer to current fashion demands it goes over and beyond that because it indicates new possibilities for creating soft draping fabrics engineered with a crisper, dryer hand.

Having successfully established the use of coarser filaments up to 8 denier in currently acceptable fabrics, Avisco is now reversing the process and experimenting with their use in fabrics which will have a soft easy flow, yet will be engendered with a new feel, a new look and a new inspiration for future fashions.

Finishers and manufacturers who have seen these textiles are almost unanimous in the opinion that standard construction cloths made with the new stiffer fibers are fabrics with a future. This is not merely because they fulfill an immediate function, but because they project into the future of fashion fabrics the lessons which have been learned today, in seeking truly basic engineered constructions for fashion trends.

man-made fibers, and of new methods and new chemicals for more efficient textile processing. New materials are tested and evaluated under commercial operating conditions, and if found to be outstanding are made available to the trade. Various types of lubricant, finishing and sizing materials have been produced by this division.

A typical contribution of T. R. D. research to rayon technique is the substitution of cake dyeing and warping from cakes, for skein dyeing and the traditional warping technique. In order to achieve this, a cake cover which would prove completely permeable for the dyes, but which did not have the disadvantages of the traditional knitted cake cover had to be found, and this was developed, after research, in the form of a special paper cover.

A Smith Drum high temperature, high pressure dyeing machine used to investigate the possibilities of dyeing Acrilan and other fibers at temperatures higher than normal.

Formerly viscose yarns were delivered to mills in skeins which had the obvious disadvantages of being easily soiled, not entirely free from knots and available only in limited length packages. To overcome this Avisco developed viscose rayon in *cake form*. A *cake* is a hollow cylinder of yarn, having a wall about one inch thick. It is the form in which rayon yarn is produced by the spinning machines in rayon plants that employ pot-spinning method of production. Cakes are lower in price than other packages because their manufacture involves less processing. They afford a cleaner yarn, because they are covered with a knit or paper cover. These covers are not removed and the yarn itself is not touched until the mill starts winding. What the industry can save in cost and gain in cleanliness due to elimination of excess handling can only be estimated.

* * *

The scope of current activities of the Textile Research Department indicates that the flow of interesting developments and information will continue. Among the machines now under study at Marcus Hook are the Pacific tow-to-top converter and the Warner and Swasey pin drafter, a pre-setting machine for acetate and Vinyon fabrics; the Barber-Colman high speed bobbin winder; the Proctor and Swartz pin tenter. Among processes under study are direct spinning from tow to yarn, warping from cakes, long

Much work has been done with the Pacific Converter, shown in the picture above. It converts continuous filament into staple of any desired length.

draft spinning and cake dyeing.

If anything is needed from a new teabag paper to a conveyor belt with a heavy denier rayon yarn in it, the industrial division of T. R. D. has either had a hand in its development or is likely to be involved in it.

Some Important Results

Doing the seemingly impossible has been a steady task during the years since the Marcus Hook plant has been in existence. In this time contributions to textile technology have constantly flowed from this practical research unit. Among its major contributions to the industry might be listed the following:

1. Cake soaking of crepe yarns.
2. Introduction into the United States of a suction drum drier for knit fabrics.
3. Avconit size for rayon and nylon hosiery yarns.
4. Quill windings from cakes.
5. Use of varied lengths of staple for worsted and woolen system spinning.
6. A new method for measurement of diffusion penetration of direct dyes in viscose materials.
7. Introduction into America of the overfeed pin tenter for drying rayon fabrics.
8. Development of pre-setting machine for acetate and Vinyon fabrics.
9. Paper cake covers.
10. Stabilization of polyethylene fabrics.
11. Introduction of viscose staple for use in bonded webs.
12. Use of crimped fine denier, long staple fiber for spinning asbestos yarn.
13. Trade methods for handling rayon staple on the cotton, woolen and worsted systems.
14. Trade methods for handling rayon yarns and staple in knitting, weaving, dyeing and finishing.
15. Winding warp beams directly from cakes.
16. Development of Avcoset finish for rayon fabrics.

* * *

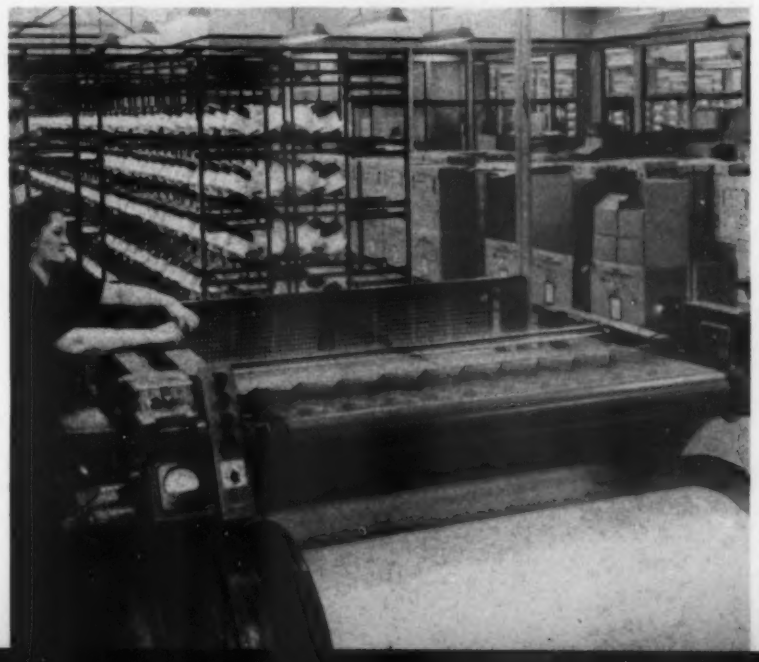
The Textile Research Department of the American Viscose Company may be taken as an example of the responsible position leading firms are today assuming in many ways. Because their position as fiber producers brings them in contact with every section of the industry from the suppliers of the raw materials to the retailers in every section where man-made fibers are used, those who conduct research and put forth its findings benefit the industry as a whole.

Where results have been handed to the industry in an impartial and disinterested way, as they have been in the case which has been discussed, their use creates a position of great prestige. The give and take between industry and research brings about a rapid technical advance. Breadth of view and right coordination produce sound economics in the industry, and the application of new findings is made profitable. This is why, despite an ever increasing demand for textile products and a dwindling production of natural fibers, America can look forward with confidence to a continuing flow of man-made fibers sufficient to take care of its needs, and possessing in many instances qualities which surpass those of the traditional materials which they replace.

(continued on second page following)

Warner and Swasey pin drafter, a pre-setting machine, is shown in operation. This is used in conjunction with the Pacific Converter for processing staple yarns.

Above: A new Saco-Lowell FS4 Rover can process all the man-made and natural fibers except cotton in any length up to seven inches. *Below:* With this new Sipp-Eastwood beamer, beams have been wound with as few as six breaks, or one break for every 3800 miles!



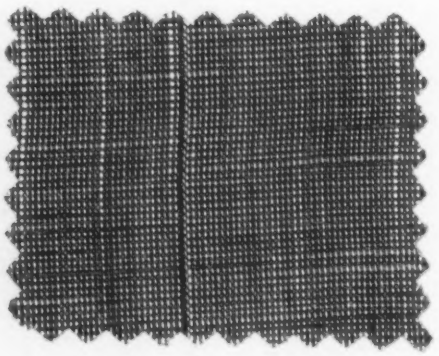
. . . *Versatility and vitality in*

100% rayon fake fur in leopard, screen printed. Water-repellent, crease-resistant, fire-retarding. For women's clothing: accessories, men's shirts and vests.

BY HANORA FABRICS CO., INC.

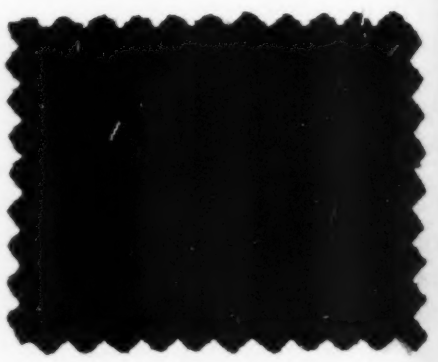
Rayon and acetate duvetyn with outstanding surface finish. Has been notably used for men's and women's sportswear and outer-wear.

BY BRAND AND OPPENHEIMER



Cross-dyed slub linen type rayon and acetate fabric. For men's and boys' sports shirts and children's apparel.

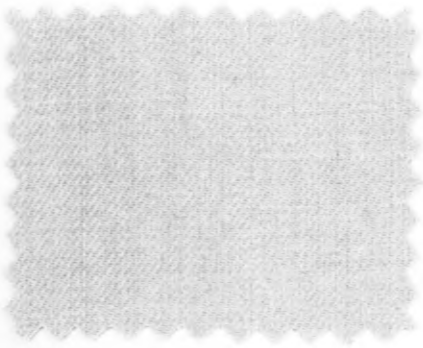
BY J. P. STEVENS & CO.



Fine wale corduroy of rayon and combed cotton which finds varied uses in the apparel field, for dresses and sportswear and men's sports shirts.

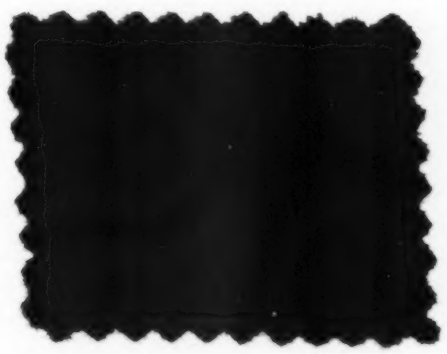
BY JUILLIARD

a wide range of new rayon fabrics



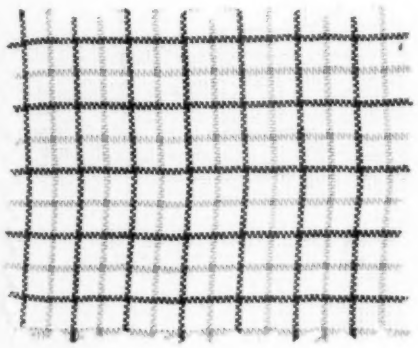
Fabric of 50% rayon and 50% acetate which is water-repellent, crease- and stain-resistant. Made in 12-12½ ounce weight for the suiting trade.

BY CROWN MANUFACTURING CO.



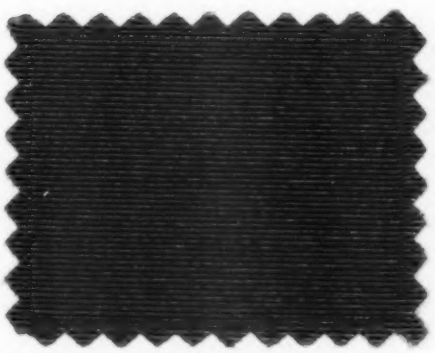
An outstanding example of de luxe velvet with Viscose rayon pile and Bemberg rayon back. The fabric is treated to ensure crease- resistance.

BY MARTIN FABRICS



100% rayon, completely washable and crease-resistant. Widely used in men's and boys' sports shirts and in children's and women's apparel.

BY MOORESVILLE MILLS



Rayon and cotton faille which is characterized by a crisp hand and lustrous look. Especially popular for evening and bridal wear.

BY BURLINGTON MILLS

Glossary of Terms Used

in connection with

Rayon

ABRADED YARNS: Continuous filament rayon yarns in which filaments have been cut or abraded at intervals and given added twist to bring about a certain degree of hairiness. Abraded yarns are usually plied or twisted with other yarns before using.

ABSORPTION: The property to attract and hold gases or liquids within the pores of a fiber, yarn or fabric.

AFFINITY: Chemical attraction. The tendency of two elements or substances to unite or combine, as fiber and dyestuff.

ANTI-CREASE PROCESS: A treatment of a fabric which enables it to resist and recover from creasing.

BEAM (or beamroll): A cylinder of wood or metal on which warp yarns are wound.

BLEACHING: Any of several processes tending to remove color or induce whiteness in a fabric without adding a white pigment or definitely changing the surface characteristics of the material.

BLEEDING: Term used to describe loss of color when wet due to improper dyeing or from the use of poor dyestuffs. Fabrics that bleed cause staining of white or other light fabrics in contact with them while wet.

BLEND: A term used to describe a yarn obtained when two or more fibers are combined in the spinning process.

BLOCK PRINTING: The printing of fabrics by hand, using carved wooden blocks. Distinguished from printing by screens or rollers.

BOIL OFF: See SCOURING.

BOLT: A roll or length of fabric. May vary in length or number of yards.

BOX LOOM: Loom using two or more shuttles for weaving fabrics containing yarns different as to size, twist or color. Typical fabrics made on box loom are crepes and ginghams.

BRIGHT YARN: General name in the rayon industry for lustrous rayon yarns as contrasted with dull, semi-dull or extra dull.

BROAD GOODS (rayon): Woven fabrics 18 inches or more in width.

CAKE: Rayon yarn collected in a spinning box by centrifugal force into an annular formed package, in the manufacture of viscose rayon yarn.

CASEIN: The protein of milk used as raw material for a special type of staple fiber.

CELLULOSE: A carbohydrate of complex molecular structure which forms the chief framework of plant cells and walls. Used as a basic raw material for making rayon.

CIRE: Lustrous patent leather effect produced by application of wax, heat and pressure.

COMBINATION: A term which may refer to yarns or to fabrics. 1. A combination yarn may be composed of two or more yarns having the same or different fibers or twists; one yarn may have a high twist, the other little or no twist; one may be viscose, the other acetate yarn. 2. A combination fabric is one which employs the above yarns, e.g., mossy crepes, romaines, alpacas, etc.

CONE: A conical package of any yarn.

CONTINUOUS FILAMENT RAYON YARN: Yarn formed by twisting two or more continuous rayon filaments into a single, continuous strand.

COP: A package of yarn, with the yarn wound on a tapered tube, ready for the shuttle.

CORD: 1. The product formed by twisting together two or more ply yarns. 2. A rib on the surface of the fabric; e.g., a ribbed fabric like corduroy, whipcord, etc.

COUNT: 1. *Cloth:* Number of warp and filling yarns per inch in woven cloth. 2. *Yarn:* Size or weight of yarn.

COURSE: A row of loops running across a knitted fabric.

DAMASK

CRIMP: 1. *Fiber:* The waviness in fibers; e.g., certain wools and rayon staple fibers. 2. *Yarn:* Also curvature produced in warp or filling yarn by weaving.

CROCKING: Term used to describe excess color rubbing off as the result of improper dye penetration or fixation.

CROSS DYED: Multi-colored effects produced in a fabric containing fibers with different dye affinities.

CUPRAMMONIUM RAYON: Filaments produced by solidifying the cellulose dissolved in a solution of copper oxide in ammonia.

DENIER: Name of an old French coin. The term is now used as the unit of weight expressing the size of rayon yarn.

The weight, in grams, of 9,000 meters of yarn is the denier. The lower the denier, the finer the yarn. For example, 50 denier rayon is twice as fine as 100 denier rayon.

DENT: The space between the wires of a reed.

DIMENSIONAL RESTORABILITY: A term used to denote the ability of a fabric to return to its original dimensions. It is usually followed by a percentage figure that specifies the dimensional change as shown by laboratory tests.

Many fabrics shrink or stretch after they have been laundered or cleaned. However, rayon fabrics which have been properly constructed and finished come back to their original dimensions by ordinary ironing. Hence a 2% dimensional restorability means that although a fabric may shrink more than this in washing, it is restored to within 2% of its original dimensions by ordinary home pressing methods.

DOBBY: 1. A mechanical attachment on a loom which permits the weaving of small figured designs. 2. A loom with above attachment.

DOUBLE WEAVE: A cloth woven with two systems of warp or filling threads so combined that only one is visible on either side.

DRESSING: A treatment given to raw fibers, yarns or fabrics.

DYEING: The process of coloring materials. 1. *Spun dyeing.* A term used to describe rayon spun from a colored solution. The filament is thus impregnated with the pigment. 2. *Stock dyeing.* Fibers dyed before spinning. 3. *Yarn dyeing.* Yarn dyed before weaving. 4. *Piece dyeing.* Fabric dyed in the piece after weaving. 5. *Cross dyeing.* Method of dyeing fabrics containing different yarns. Varied color effects are possible by using dyestuffs which have different affinities for the different yarns. 6. *Ingrain.* Dyed in the yarn or thread prior to manufacturing; e.g., hosiery yarn that is dyed before knitting.

ELASTICITY: The property of a yarn or filament to elongate upon applying tension, and to recover its length upon releasing tension.

ELONGATION: The deformation caused by a tensile force. It is expressed as a percentage of the original length.

EMBOSSING: The art of producing raised or projected figures or designs in relief on surfaces. Usually produced on fabrics by engraved, heated rollers to give a raised effect. Washing, steaming, water spotting or dampness tend to remove the design. Embossing velvet is done by pressing part of the pile flat.

END: One warp yarn or thread.

EXTENSIBILITY: The length gained by stretching to the breaking point. It is expressed in percentage of the original length.

FABRIC: Cloth, goods or textile material woven or knitted of any textile fiber.

FASHIONED: Shaped in the knitting process by the increase or decrease of the number of needles in action.

FASTNESS OF DYE: Property of dye to retain its color when cloth is exposed to sun, perspiration, atmosphere, washing or other color-destroying agents. The term fastness is a relative one as a dye may be reasonably fast to washing and only moderately fast to light. Fastness of color may be tested by standard procedures. Remarkable progress has been made in the dyeing of faster color rayons.

FELT: 1. *Pressed.* A matted material made from wool, hair, fur or certain synthetic fibers by a suitable combination of pressure, heat, moisture (without spinning, weaving or knitting); e.g., felt hats, 2. *Woven.* A heavy woven fabric characterized by a nap which has been subjected to a felting operation.

FIBER: An individual short length filament, similar to the natural cotton or wool fibers or filaments. Rayon fibers can be made of any desired length.

FILAMENT: A variety of fiber characterized by extreme length. *Note:* The extreme length of filaments permits their being used in yarn without twist or with very low twist, and they are usually fabricated into yarn without the spinning operation required of fibers.

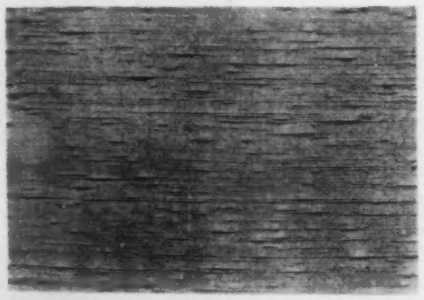
FILLING: The yarn running from selvage to selvage at right angles to the warp. Each crosswise length is called a *pick*. The filling is sometimes referred to as *weft* or *woof*.

FINISHING: All the processes through which cloth is passed after leaving the loom in preparation for manufacture or sale.

FINISHED GOODS: Cloth after passing through finishing processes.

FLEXIBILITY: The property of bending without breaking.

FLOAT: 1. The portion of a warp or filling yarn that extends over two or more adjacent filling picks or warp ends in weaving for the purpose of forming certain designs. 2. Flaw in cloth made by a misweave.



FAILLE

GAGE OR GAUGE: The gauge indicates fineness of texture in knit fabrics. It refers to the number of needles in a given width. For example, in full fashioned hosiery the number of needles per 1.5″ represents the gauge; in circular knit hosiery it is the number of needles per 1″. The higher the gauge-number the finer the texture of the fabric.

GARNETTING: Process for reducing various textile waste materials to fiber by passing them through a machine called the garnett.

GAS FADING: Also called atmospheric fading, it is the effect of certain acid gases from fuel combustion upon some types of dyestuffs used in the dyeing of fabrics.

GLACE: A glistening, lustrous effect imparted to fabrics in finishing.

GREIGE GOODS: Term designating fabrics just off the loom or knitting machine and in an unfinished state.

GREY GOODS: Same as greige goods.

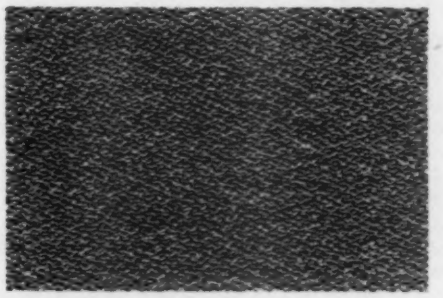
HAND: Term used to describe the touch or handle of fabrics.

HARNESS: The frame holding heddles in position in the loom during weaving. Also known as *Shaft.*

HEDDLE: A wire or cord with a loop or an eye through which the warp threads pass. The heddle controls the movement of these threads to form the shed for the shuttle to pass through.

HYGROSCOPIC: Property of absorbing moisture from the air — common to rayon, silk, wool and other natural fibers.

KNITTING: To produce fabric on more than one needle by a method of interlooping yarn or yarns. The lengthwise rows of loops are known as *wales*; the crosswise, horizontal rows of loops as *courses.* 1. *Circular knitting:* The fabric comes from the knitting machine in the form of a tube. The threads run continuously in one direction in loops around the fabric.



MOSSY CREPE

2. *Flat knitting:* Is similar in construction to circular knitting. The differences are: (a) the fabric comes from the knitting machine in a flat form just as woven fabrics do; (b) the threads run in loops, alternately back and forth across the fabric; (c) flat knit fabrics are capable of being fashioned or shaped in the knitting. 3. *Warp knitting:* Here, the fabric usually comes from the knitting machine flat just as woven and flat knit fabrics do. The threads run in loops in a lengthwise direction.

LENO: A weave in which the warp yarns are arranged in pairs so as to twist one around the other between picks of filling yarn, as in marquisette. This manner of weaving gives firmness and strength to an open weave cloth and prevents slipping and displacement of warp and filling yarns.

LINTERS: Short cotton fibers which adhere to the seed after the first ginning. These are cut from the seed and used as a source of cellulose for the manufacture of rayon.

LUSTER: Shine or sheen of yarns, staple fiber or finished fabrics.
LUSTERING: Finishing process which produces a luster on yarns or cloth.

MENDING: Repairing weaving imperfections of fabrics, particularly in woolens and worsteds.

MILL ENDS: Remnants or short lengths of finished fabric.

MILL RUN: Ungraded yarn or fabric yardage.

MIXTURE: See BLEND. Term generally used for woolens and worsteds.

MULTIFILAMENT: Applied to rayon yarns with many fine continuous filaments or strands. Multifilament rayon yarns produce especially soft fabrics.

NAP: The downy or fuzzy surface of cloth produced by brushing.

NOILS: Short knotted fibers which are rejected in the combing process in preparing yarns.

NOVELTY YARNS: Yarns produced for special effects. Usually uneven in size or colors. Flakes, nubs, slubs are typical of novelty yarns.

NUB YARN: Novelty yarn containing slubs, beads or lumps introduced for a purpose.

PAD DYEING: A form of dyeing done by application on a padder or mangle.

PANNE: Flattened, such as panné velvet or panné satin.

PATTERN: Design in woven or printed fabrics. Sometimes a sample of fabric.

PEBBLE: The irregular or rough surface texture of a fabric.

PICK: A throw of the shuttle. One filling thread is termed a pick on the loom or in the fabric.

PIECE: A standard length of a woven cloth as 40, 60 or 80 yards.

PIGMENT: An insoluble finely divided substance used to deluster or color rayon yarns or fabrics.

PIGMENTED YARN: A dull or colored yarn spun from a solution to which a pigment has been added.

PLAIN KNIT: Simplest knit structure, as in hose.

PLAIN WEAVE: The simplest of the fundamental weaves. Each filling yarn passes alternately under and over each warp yarn.

PLATED: A fabric that is produced from two yarns of different colors, characters or qualities, one of which appears on the face and the other on the back. A yarn may be plated by being covered by another yarn.

GABARDINE

PLY: Yarns twisted together are said to be plied. Each end or thread is a ply.

PRINTING: Producing a pattern on yarns, warp or fabric. 1. *Application printing:* The colors for the desired design are applied directly to the cloth. Very much the same principle as in paper printing. 2. *Blotch printing:* The background color is printed rather than dyed. 3. *Discharge printing* (white and colored): *White* discharge printing — the fabric is piece dyed, then the color is discharged in those places where white designs are desired. *Colored* discharge printing — same as the white discharge printing except that a color is mixed into the discharging paste. The discharging chemical in the paste removes the color in certain desired portions of the dyed

(please turn the page)

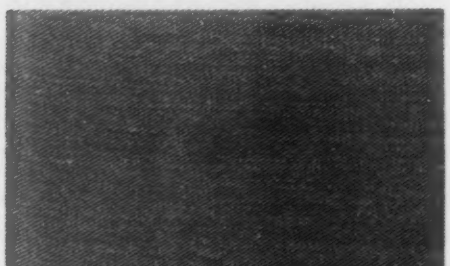
ground. The color that has been added to the print paste replaces the discharged color with another desired shade. 4. *Resist printing:* In this method the design may be produced (1) by applying a resisting agent to the desired design, then dyeing the cloth, in which case the design remains white though the cloth takes the color of the dye; (2) by including a dye resisting agent in the color to be used for the design, then dyeing the fabric. In this case the color of the design is not affected by the subsequent dyeing of the fabric. In other words, the resisting agent resists dyeing and leaves either a white design or a colored design unaffected by the dyeing of the fabric.

RAYON STAPLE: Rayon fibers of spinnable length manufactured directly or by cutting continuous filaments.

RAYON WASTE: All types of waste obtained from producers' operations on rayon yarn; also from manipulation of yarns and fabrics.

RAYON YARN: A group of rayon fibers or filaments twisted together to form a continuous strand for use in weaving, knitting or braiding.

REED: Part of a loom consisting of dents through which the warp yarns are drawn in a definite order and which beats the filling into the cloth.



TWILL

RESILIENCY: Property of fiber or fabric to spring back when crushed or wrinkled.

RIB: A corded effect in a woven fabric. Can be either lengthwise, crosswise or diagonal.

RIB KNIT: Knit fabric with lengthwise ribs formed by wales alternating on right and wrong sides. If every other wale alternates between right and wrong side it is called 1 x 1 rib. If two wales alternate it is called 2 x 2 rib. A rib knit fabric is more elastic than plain knit and has form fitting characteristics.

ROVING: A loose assemblage of fibers drawn or rubbed into a single strand with very little twist. An intermediate stage between sliver and yarn.

RUN PROOF: Describes a knitted construction in which locked loops prevent runs.

RUN RESIST: Describes a type of knitted construction which reduces runs.

SCOURING: Removing the sizing and tint used on the warp yarn in weaving, and in general cleaning the fabric prior to dyeing.

SEAMLESS: Describes a tubular knit fabric without seams, such as seamless hosiery.

SECONDS: Fabrics (woven or knitted) imperfect because of flaws in weave, finish or dyeing. Sold as *seconds*.

SHAFT: Same as HARNESS.

SHED: Passageway or opening of the warp threads in the loom made by raising and lowering warp threads by the heddles, allowing for the insertion of the filling thread by means of the shuttle.

SHRINKAGE: The contraction of width or length of fabrics usually after wetting and redrying.

SHUTTLE: Device used to carry filling or weft yarns back and forth across the warp to form the woven cloth.

SIZING: Operation consisting of applying onto yarn starch, gelatin, oil, wax or any other suitable ingredient to aid the process of fabrication, or to control fabric characteristics, such as crepe effects. Warp sizing is generally referred to as slashing.

SKEIN: A yarn package in the form of a coil made on a reel. Now used chiefly for yarns to be soaked for throwing or for dyeing.

SLASHING: See SIZING.

SLEY: The number of warp yarns per inch in a woven cloth on or off the loom.

SLIPPAGE: The sliding or slipping of the filling threads over the warp ends, or vice versa, due to loose weave or unevenly matched warp and filling, thus leaving open spaces.

SOAKING: Treatment applied to skein or cake rayon yarns preparatory to throwing; i.e., twisting for crepe twist.

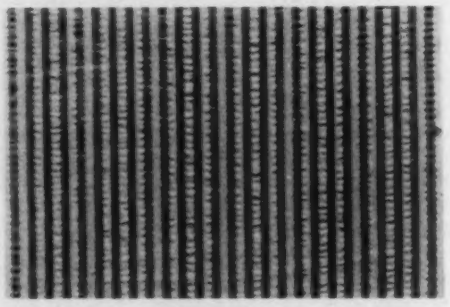
SPINNERET: A cap or jet with fine holes through which the spinning solution is forced.

SPINNING: 1. *Chemical Spinning:* The process of producing rayon, including the extrusion of the spinning liquid through a spinneret into a coagulating medium and the gathering and the winding of the filaments onto bobbins or in cake form. 2. *Mechanical Spinning:* Twisting together and drawing out short fibers into continuous strands known as yarn.

SPUN RAYON: General term applying to yarns and fabrics made wholly or principally of rayon staple.

SPUN RAYON YARN: Yarn made from rayon staple.

STAPLE: 1. Term used to denote lengths of any fiber which require spinning and twisting to form a yarn. 2. Any fabric or article sold year after year in contrast to a novelty.



SEERSUCKER

STOCK DYEING: Process of dyeing scoured fibers before carding.

STRETCH: The lengthening of a filament, yarn or fabric upon application of stress.

TABBY: Same as plain weave.

TENSILE STRENGTH: Breaking strain of yarns or fabrics. High tensile strength means strong yarns or fabrics.

TEXTURE: Structural quality of a fabric; the surface effect of cloth.

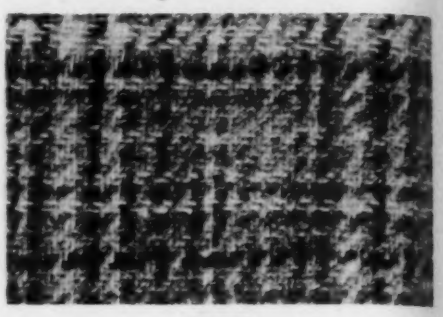
END

THREAD (sewing): A variety of yarn, normally plied, characterized by a combination of twisting and finishing with solid or semi-solid, wax-like materials to secure a smooth, compact strand which is quite flexible but presents no loose fibers.

THROWING: Term used for twisting yarns.

TOP: 1. The longer wool fibers separated from short ones (noils) by combing. Used for worsted yarns. 2. An untwisted strand of staple fibers after combing or made direct from rayon tow.

TOW: A continuous, loose rope of rayon filaments drawn together without twist.



TWEED

TWIST: Turns in a thread or yarn usually expressed in turns per inch.

VAT DYED: Dyed with insoluble dyes formed on the fiber by oxidation.

VISCOSE SOLUTION: Solution from which rayon filaments are produced.

WALE: A ridge or row of loops running lengthwise in woven or knitted fabrics.

WARP: Set of yarns which run lengthwise in woven and warp knit fabrics. See END.

WARP PILE: An extra set of warp yarns woven into a fabric to form an upright pile.

WARP PRINT or SHADOW PRINT: The warp threads are printed before weaving giving a faint and shadowy effect when woven.

WASTE: Fiber and yarn by-products created in the manufacturing or processing of fibers or yarns.

WEAVING: The method or system of interlacing of warp and filling yarns to produce a woven fabric.

WEFT: Same as filling or woof.

WELT: Hem or garter top of hose.

WIDTH: Distance between the two selvages of a cloth.

WINDING: Transfer of a yarn or thread from one type of package to another; for example, from cakes to cones.

WOOD PULP: Raw material for viscose rayon and, to a growing extent, for acetate rayon.

YARD GOODS or YARDAGE: Cloth sold by the yard as distinguished from made-up garments.

YARN: A continuous strand for weaving or knitting. 1. *Continuous filament rayon yarn:* yarn formed by twisting two or more continuous rayon filaments into a single, continuous strand. 2. *Spun rayon yarn:* yarn formed from rayon staple by spinning or twisting into a single continuous strand of yarn.

YARN DYED: Yarns dyed in the skein or package before weaving.

PROMOTING A HIDDEN PRODUCT

How the makers of a "hidden" textile fashion product developed a promotional program of wide scope which proved eminently successful.

David B. Carmel worked hand-in-glove with research and production departments while putting promotional program into operation.

ONE OF THE MOST difficult tasks confronting makers of *concealed* products has been proper exploitation and promotion. Most carnival pitchmen insist, "You can't sell 'em what they can't see." That's why they exhibit the tattooed lady and assorted midgets outside the freak show. They show the customer what's in store for him when he buys his ticket.

For too many years industry had believed the pitchman's axiom. The chemical makers whose products contributed to a superior paint, the technician whose motors made a quieter refrigerator, no less than the hair canvas manufacturer whose interfacings made a sturdier, better-fitting fashion garment . . . these are typical examples of producers who, in one form or another, uttered the thought: "The customer never sees our product, so why should we try to promote it?"

In the fashion field, hidden products abound; so that in breaking away from this tradition, the makers of Armo hair canvas have developed and executed a program worthy of the more glorified fashion products. This educational and promotional program, for one of the most *hidden* of fashion essentials, was conceived and developed through the investigations and shrewd foresight of David B. Carmel of Sheerr Brothers, makers of Armo, who brought to the campaign, first, a notable knowledge of fashion and, second, a sound basic sales theory.

An interesting point is that for fifty years the Sheerr organization had been content to sell their product in the routine manner used for similar products. This called for a quality product which had definite merits, but the selling results were dependent solely on the theory of the satisfied customer who, once sold, stayed sold. How else, ran the theory, could you sell a product like interfacings? What drama or fashion news attached to it? The main thing was to keep the customers, in this case the apparel manufacturers, sold.

A Step-by-Step Program

Dave Carmel felt that such sales methods might be steady and sure, but lacked imagination, drive and speed. He felt that an intelligent and challenging promotional program lay not only in keeping the manufacturers sold, but in educating the buyer, the retail store and its sales people, and even ultimately the consumer. He believed that interfacings could be dramatized.

Step-by-step, the basic plan was this: First, sell the immediate customer, the manufacturer, through his customer, the retailer. Second, sell the proximate customer, the retailer, through his customer, the consumer. Third, sell the remote customer, the consumer, through basic education in the construction of a garment. Working the formula in reverse, the theory held that an informed consumer would ask the retailer for garments constructed with Armo hair canvas. In turn, the retailer would specify that the manufacturer give him goods interfaced with Armo. And, finally, the manufacturer would accept no substitute.

A hangtag was developed which carried the now famous trademark of the Armo goat. This was exploited in a series of newspaper and trade magazine ads. Consumer copy stressed the fact that a fashion was only as good as the materials that went into it. Trade copy let the Armo goat do its own bleating and pointed out that retailers and their customers were using the hangtag as an additional sales feature.

Reprints of the advertisements were sent to store buyers and merchandise managers in the form of flyers and counter cards which told the story: Fashion products constructed of and identified with Armo hair canvas would meet less sales resistance and offer better selling points than the usual canvases, hair cloths, buckrams and crinolines.

The campaign went on to claim that Armo hair canvas had unique properties, as shown in its ability to snap back after crushing; that it eliminated the horse-hair prickles usually found in men's suits after cleaning and steaming; that the original cut and drape would last almost permanently; and that the special construction added to the life of the garment without increasing its weight or bulk.

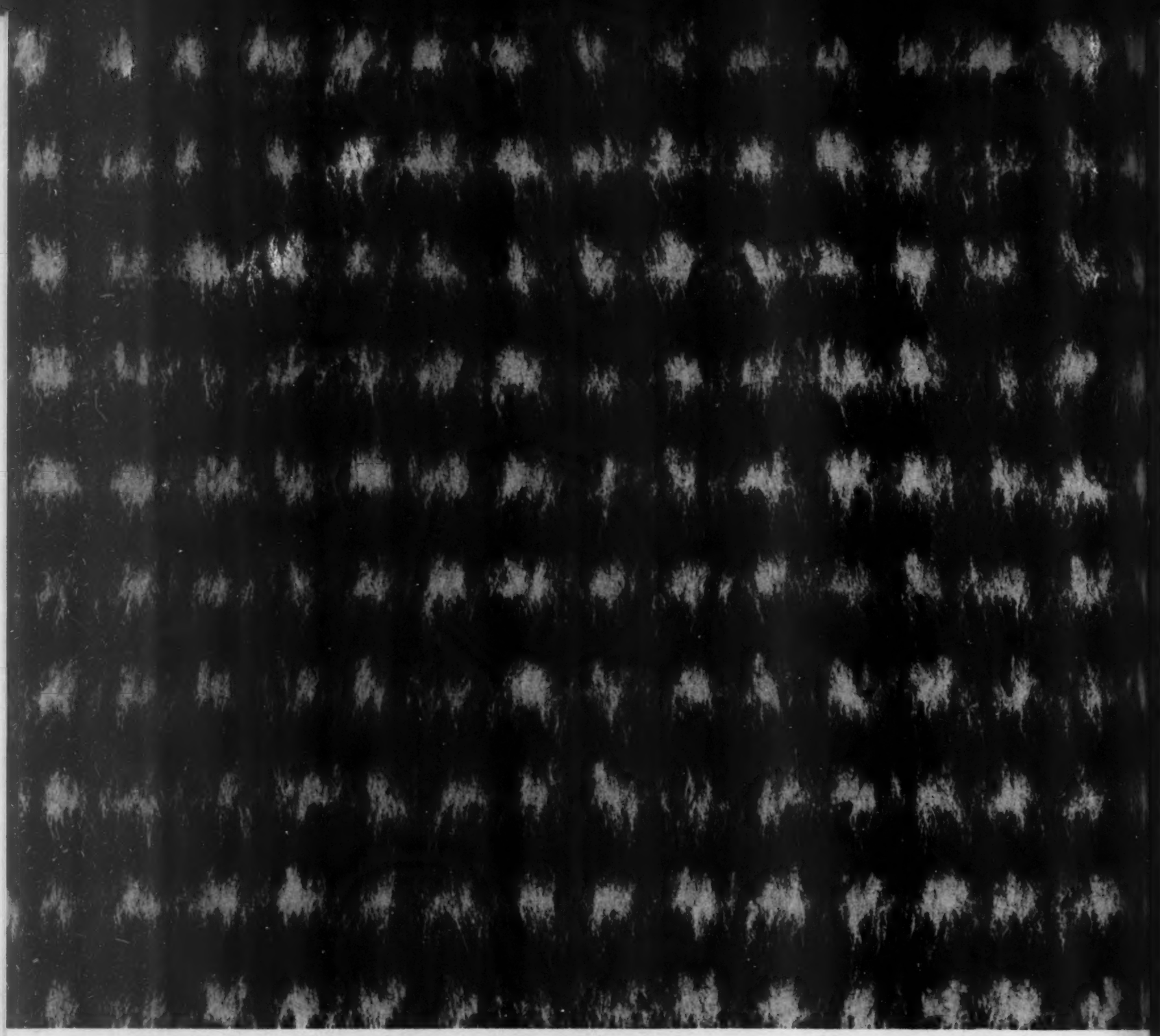
The plan was given further impetus when the idea was devised of featuring Armo-conscious retailers in Sheerr advertisements. This gesture won retailer loyalty and attracted new retailers who, in turn, introduced new manufacturers to the Sheerr organization.

Additional Markets Encouraged

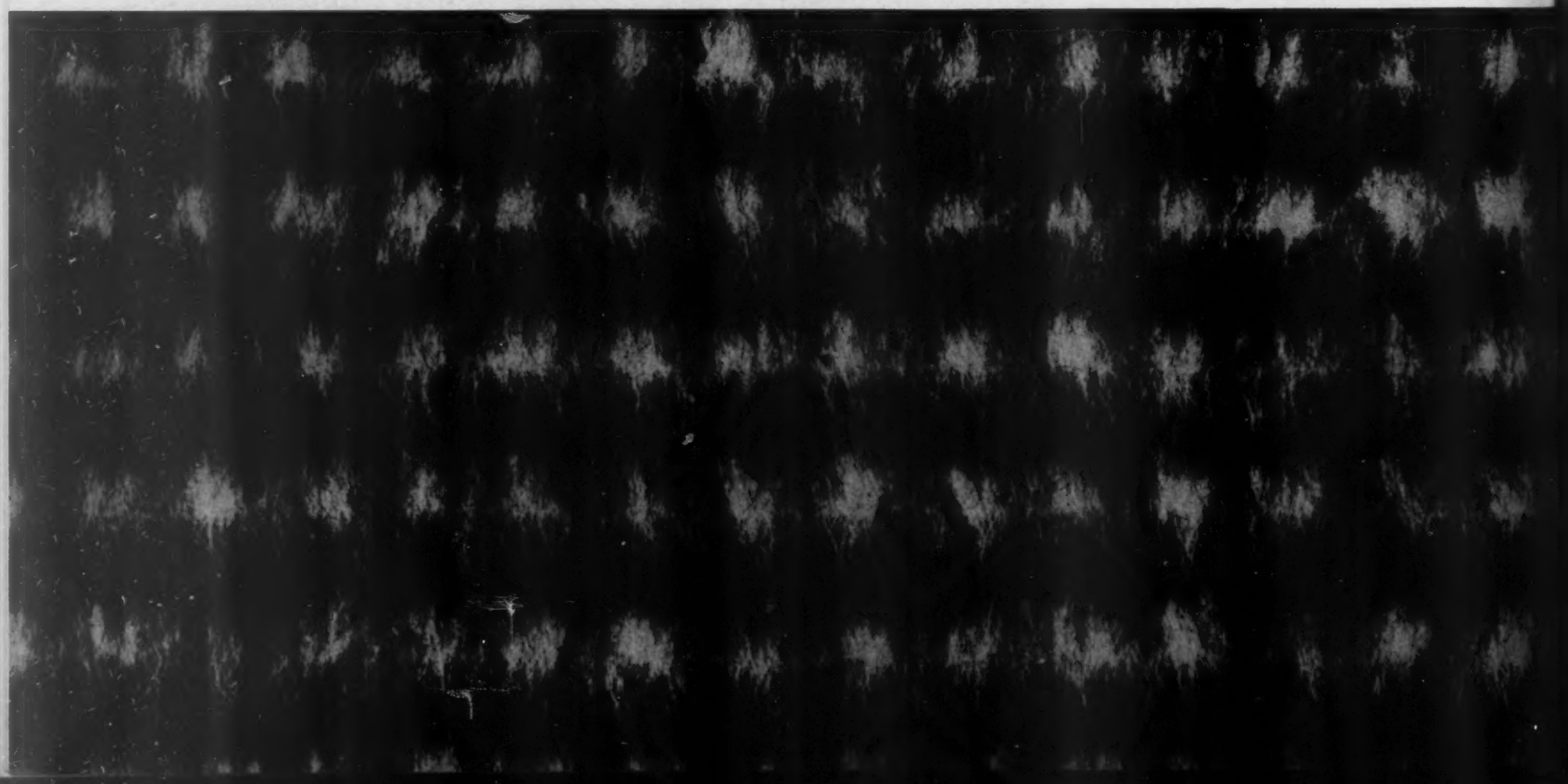
Even while the promotional campaign was being waged on a full scale, Dave Carmel kept a sharp eye on his laboratory. It was here, he knew, that the key to the future lay.

The once-neglected women's market was given special attention by the research department and soon special interfacings were going into ladies' coats, suits, and dresses; then came children's clothing, handbags, neckties.

The final step lay in personal contact. Carmel and his crew visited manufacturers and retailers with a sound product, faith in it, and a well-planned promotional program. He preached quality and he kept selling. Today the Sheerr organization feels the hidden product bogey is licked. And well they should, for their overall sales volume has trebled since they first brought their hidden product into the open.



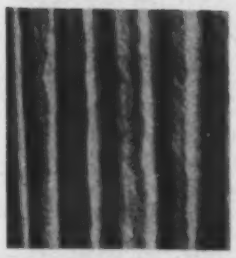
PHOTOGRAPH REPRODUCES A BLACK AND WHITE BROKEN CHECK WITH ZIBELINE FINISH. THE DISTINCT WAVY EFFECT DEVELOPS FROM THE LOOP WEAVE CONSTRUCTION. BY FORSTMANN.



XUM

TEXTURE AND HAND HOLD PRIMARY IMPORTANCE

Age lends to texture luster and patina. By processes of finishing, which took thousands of years to perfect, man now rivals nature.



WHEN WE SEE a roughened old stone wall, the rippling folds of a sculptured dress, the delicate moldings of head, hair and neck in a fine modeling, we tacitly acknowledge that texture is important. Yet texture can be perfect and still too newly fashioned to satisfy. This is one reason why old stones, old cities, old faces are often most admired. By her inimitable processing, nature in time adds beauty to the already perfect. We recognize this enhancement as patina, mellowness or aging, and treat it with respect.

For more than four thousand years men have been weaving fabrics in America. For at least so long they have sought to perfect the art of the finished product, holding nature as an example of attainment. Our scientific and technological weapons are directed toward this objective. When we acclaim a new advance in weaving and finishing achievement today it is because, like nature, we have given time and patience to the processes which produce perfection in texture and hand.

Our fashion industry is becoming increasingly aware of the superb accomplishment of American mills in this direction. For the past few seasons, the great mills of our country have wrought miracles in achieving new and fascinating textures to intrigue the fashion-sensitive consumer. It is in this direction of texture, a direction which holds an infinite possibility, that our industry must continue to go.

Vicara Staple Fiber

PROGRESS IN BLENDS

A further report on Vicara, the illustrious derivative of agriculture, which joins the established man-made fibers to create new possibilities for the textile engineer.

THE TREND OF COMBINING or blending two or more fibers is a logical trend. This is one of the big technical developments of today because it enables the technician to seek a solution, by a new form of engineering in textiles based on precision both of method and result, for every new problem.

The ability of Vicara to up-grade a fabric when used in conjunction with another fiber was immediately recognized by the textile industry, and its most important applications so far developed have been along these lines.

Take, for example, a blend of Vicara with nylon. The warmth, moisture absorption and softness of Vicara combine with the strength and abrasion-resistance of nylon to give a launderable, durable, warm and comfortable yarn that is excellent both in knitted and woven fabrics.

Vicara-woolen blends, which harmonize two protein fibers of similar type, are increasing in popularity for a very wide range of goods including suitings, sweaters, overcoatings, shirtings, dress goods, and knit goods such as gloves and hosiery. The secret here is a high compliance ratio, in which characteristic Vicara is more wool-like than wool. For this reason and others, such as the smoothness of Vicara fibers, the Vicara-cashmere blend achieves the ultimate in hand.

With rayon, Vicara's crease-resistant property is of especial value. Where this blend contains 40% or more of Vicara it is said that finishes to build up the crease-resistance become unnecessary. At the same time, it adds softness to the blend by virtue of its lower initial stiffness and greater compliance, thus avoiding the stiffening effects of resin treatments. The washability and stability are also at the same time improved.

With acetate, Vicara gives good wrinkle recovery, better moisture absorption (which makes for greater wearing comfort), a stronger dimensional stability, and a much softer hand. This blend has therefore been woven for suitings.

With Dynel, Vicara is being used in pile-type fabrics for military uses, which may result in new fur fabrics for civilian needs, outstanding in softness and loft.

When Vicara is blended with cotton, there are definite improvements in hand, in appearance and in wearing comfort. The fabric, even with repeated launderings, retains the elasticity and liveliness which cannot be obtained with unblended cotton. This is a use which promises important advantages.

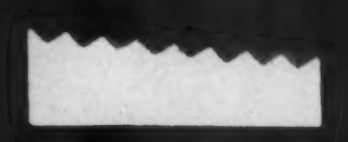
* * *

To summarize, Vicara has its own particular warmth, feel and drape. It has absorbency which it can lend to the non-absorbent fibers. Its tensile strength is good, both wet and dry. It is launderable and possesses a very low shrinkage rate. It is highly wrinkle- and crease-resistant. It is moth-resistant, mildew-resistant and does not have any properties which may be aggravating to allergy conditions.

Produced in several deniers and cut to staple of the desired length, Vicara is able to be spun on all systems and blended with all fibers. Endowed with an affinity for almost all dyes, it makes possible the production of new, and the up-grading of existing, blends of many types and provides a fresh impetus for increased sales in all branches of the fashion, apparel and furnishing industries.

Cashmere-touch cross-dyed chevron fleece of wool, Vicara and nylon.
By MILLIKEN

14 oz. rayon and Vicara yarn-dyed woven suiting.
By MOORESVILLE MILLS



Cotton rayon and Vicara shirting woven for Manhattan Shirt.
By MOORESVILLE MILLS

. . . THE CAPACITY TO ADAPT TO EVERY NEED

Moth proof knitting yarn. 50% Vicara 50% nylon.
By LILY MILLS

Vicinette fleece coating. 52½% wool. 25% Vicara. 12½% nylon.
By MILLIKEN

Sports-shirting fabric. 55% wool. 30% Vicara. 15% nylon.
By BACHMANN UXBRIDGE

Martha Jungerman, Assistant Professor at Philadelphia Textile Institute, explains intricacies of a Jacquard hand loom to two students at the Institute.

OPPORTUNITIES for WOMEN in TEXTILES

A survey of the textile education field points up some specific instances of intelligent efforts to provide needed working power for the ever-expanding textile industry.

THE SCOPE AND OPPORTUNITY for women in the textile manufacturing industry and its related fields has long been underestimated. As technically trained men are called into the armed services in the present mobilization era, the need and demand for trained women grow by leaps and bounds.

Director of Defense Mobilization, Charles E. Wilson, in suggesting a program to combat the serious shortage of scientifically and technically trained personnel, points out the great need for interesting and training larger numbers of men and women for fields which require scientific and technical training. With the increased attention of the entire textile industry toward a scientic approach in the design and development of equipment and products, there can be no question of the consistent and increasing need for technically trained personnel.

At present women can and do fill many important positions in the textile manufacturing industry. They are technical representatives for dyers, weavers and converters. They are found in large numbers in laboratories for research, quality control, physical testing and chemical analysis. They serve as inspectors for the government buying agencies. There are women designers of all types of textile products, including Jacquard, knitted and fancy woven fabrics; they also work in fabric development departments and in their laboratories. Women are also employed by chemical and dyestuff companies which supply the textile industry, many of them holding key positions. This is a limited listing of only a few of the areas in the manufacture of textiles in which women have proved their ability.

When one considers the related fields where a technical knowledge of textiles is necessary or valuable, the horizons appear limitless. In advertising, in promotion, in fashion coordination and textile education, women have made splendid contributions. In the clothing industry, in the fields of home furnishings and decorative fabrics, many of the leaders are women. Likewise in the retail store departments of ready-to-wear, linens and domestics and piece goods, female personnel make up the overwhelming majority.

Specialized Training Schools

Nearly every issue of the textile trade journals and magazines attests to the importance of women in the industry. Much of this is, however, overlooked until attention is focussed on the number of women already employed, and the proven advantages of having women work along with men to help build a greater textile industry. Schools of specialized training in the textile field are gradually becoming aware of the place of women in the industry and are planning their curricula accordingly.

At Philadelphia Textile Institute, Martha Jungerman, Dean of Women, has thirty young women enrolled in both regular and post-graduate courses. Under Miss Jungerman's competent supervision and foresight, these young women should be well equipped on graduation from the Institute to make fine contributions when placed in the industry. Within the last few years, over forty women students from this Institute alone have made their mark with well-known textile houses, some of them in responsible and key positions.

President Bertrand W. Hayward of the Institute is now work-

ing with Miss Jungerman on a new curriculum for training young women for particular areas where it is felt the gap is widest in availability of trained personnel. The added courses will provide specific learning areas to prepare personnel as technical laboratory assistants, as assistants to magazine, newspaper and other communication editors in the fabric field, and to provide qualified graduates for the design studios in various segments of the industry. These courses will be opened for high school graduates, and will offer opportunity to girls in fields where the demand for personnel exceeds the supply.

* * *

The New Bedford Textile Institute in Massachusetts for several years has offered a special course in *Textile Technology for Girls* which is open to high school graduates. It is a two-year course covering such subjects as Principles of Yarn and Fabric Manufacture, Designing and Analysis of Fabrics, Dyeing and Finishing, Microscopy, Textile Testing, and Textile Coloring. Equipped with a knowledge of these subjects, the graduates have been able to obtain positions as technicians in testing laboratories, in design studios, and in quality control. The courses provide likewise for a career in fields for which these young women are considered ideal — as designers and design technicians, adapters of motifs and patterns for textile materials, as teachers in textile and home economics departments in colleges and institutes, and in vocational secondary schools. Some of the graduates do lecturing and demonstration work in textiles before women's clubs, store personnel and school groups, covering such subjects as qualities, uses and care of textile materials and garments.

This semester the Institute has inaugurated new courses in fine arts to include foundation design, life drawing, dress design, pattern drafting, fashion illustration and garment manufacturing. "The combination of fabric and garment manufacture knowledge, offered in these courses," said Mr. George Walker, the President, "equips the graduates with the training necessary to carry on the work. The students will be better able to style the fabric for the particular garment and to fashion it in the best possible manner from the point of view of the product."

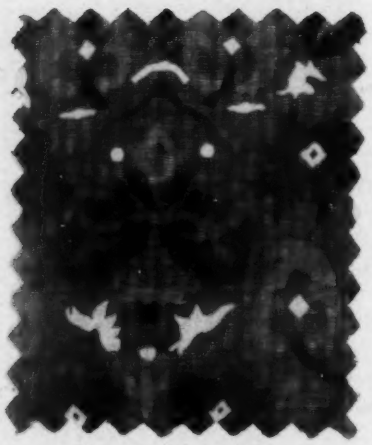
* * *

At the Fashion Institute of Technology, a part of the University of the State of New York in New York City, courses in textiles and textile design are given to a predominantly female student body, in addition to classes in fashion design and illustration, draping and garment manufacturing. While the problems which confront President Mortimer C. Ritter, the first president of the Institute, differ from those of the two aforementioned Textile Institutes, the textile courses which are featured are Applied Textiles, a basic foundation course given for three terms; Physical and Chemical Testing of Textiles, Identification of Fabrics, Spot and Stain Removal and the Care of Clothing. All of these are intensive one-term courses. There is also a course in Man-made and Synthetic Fibers and Filaments, which is particularly feasible in this school since the work of the Fashion Institute is especially synchronized with the needs and developments of the textile and apparel industries in New York City.

* * *

With this growing recognition of the industry's need on the part of these three institutions all specializing in textiles, the day is not far distant when there will be sufficient women technically trained to replace skilled men of the textile industry who have been called into the armed services. In peacetime, their training, coupled with their knowledge of what a woman looks for in a fabric or garment, will do much toward building a greater textile industry. — *G.E.L.*

Learning to use the Soxhlet extractor at the textile testing laboratory of Fashion Institute.



This sheer, crinkled organdie has lint-free quality, crisp hand and beautiful translucent colors which remain through the life of the fabric, permanently sealed in by the Bellmanized finish. The pattern was inspired by traditional Italian peasant art. BY FISBA FABRICS.

Fabric passing through processing machinery at the New Jersey, finishing plant of Bellman Brook.

THE FINISHER SEES THE TREND

Called upon to make perfectly finished goods from whatever is shipped him, the finisher must be a step ahead of the fashion pace.

HAD YOU LIVED in the year 1627 and chanced to be engaged in the textile business, one of your correspondents might one day have sent you a news item reading something like this:

> John Jasper Wolfen has applied for a patent in regard to "a new invention for the making and preparing of certain Stuff and Skynes to hold out wett and rayne."

How important such a finish might be, if successful, to your coming year's trading, you would have begun at once to estimate with lively imagination.

The art of finishing textiles is, of course, centuries old. It may be primarily defined as the process or processes by which fabrics are bleached, dyed or otherwise treated or printed to achieve certain intrinsic and surface qualities to meet specific requirements, to improve their general behavior and to increase their life-expectancy.

To perform these functions the modern finisher must be not only proficient in his own art but also an expert on many subjects. For example, he must know fashions, both traditional and contemporary.

His plant operation must be prepared to change its tempo to accord with any fashion pace. As new texture effects and constructions come into use, the finisher must be always sufficiently ahead of these developments to handle them satisfactorily when they come through. He is called upon to make perfectly finished merchandise out of whatever is shipped to him, regardless of what degree of success was achieved by the weaver in engineering the best cloth for a given purpose.

Must be Vigilant

He must keep a vigilant eye on every yard of goods sent him, not only as to the measurement, the condition of the goods and deliveries, but he must be ready to use his knowledge of textiles and fashions to correct and improve the cloth through the application of the most effective processes.

To do these things and still to stay abreast of fashion changes he maintains extraordinary plant flexibility. He has, in fact, no way of scheduling his production three to six months ahead as do most branches of the industry. Through this flexibility the finisher performs his greatest service to the independent converter and to the fashion industry. Style leadership is not to be fettered or delayed by the ponderous resources and demands of mass production. It must be venturesome, resourceful, and more often right than wrong. Its greatest achievements, therefore, follow the correlation of the knowledge, experience, and skill of spinner, weaver, converter and finisher. In the finishing plant the final correlation takes place.

The enormous importance of finishing to the world of fashion may be gauged by the buying habits of today's shopper. Confronted by competitive types of apparel and piece goods, she commonly specifies a certain proofing or processing she has heard or read about, one based on her special requirements. She may require a finish or combination of finishes such as crease-resistance with starchless crispness; a finish that improves the hand and drape of lawns and muslins; or one that gives a textured matelassé or rippled surface. Another finish gives cotton the frosted look of crushed ice in a glass; still another imparts two or more degrees of transparency. A finish frequently looked for in children's clothing is one that gives cotton a higher degree of drape or softness. For organdies and other filmy cottons, it's the bouffant crispness which makes the fabric stand out that is most desired. In each of these, the special finish must not wash out; it must be fast for the life of the fabric and it must not require replacement.

Permanent Finishing

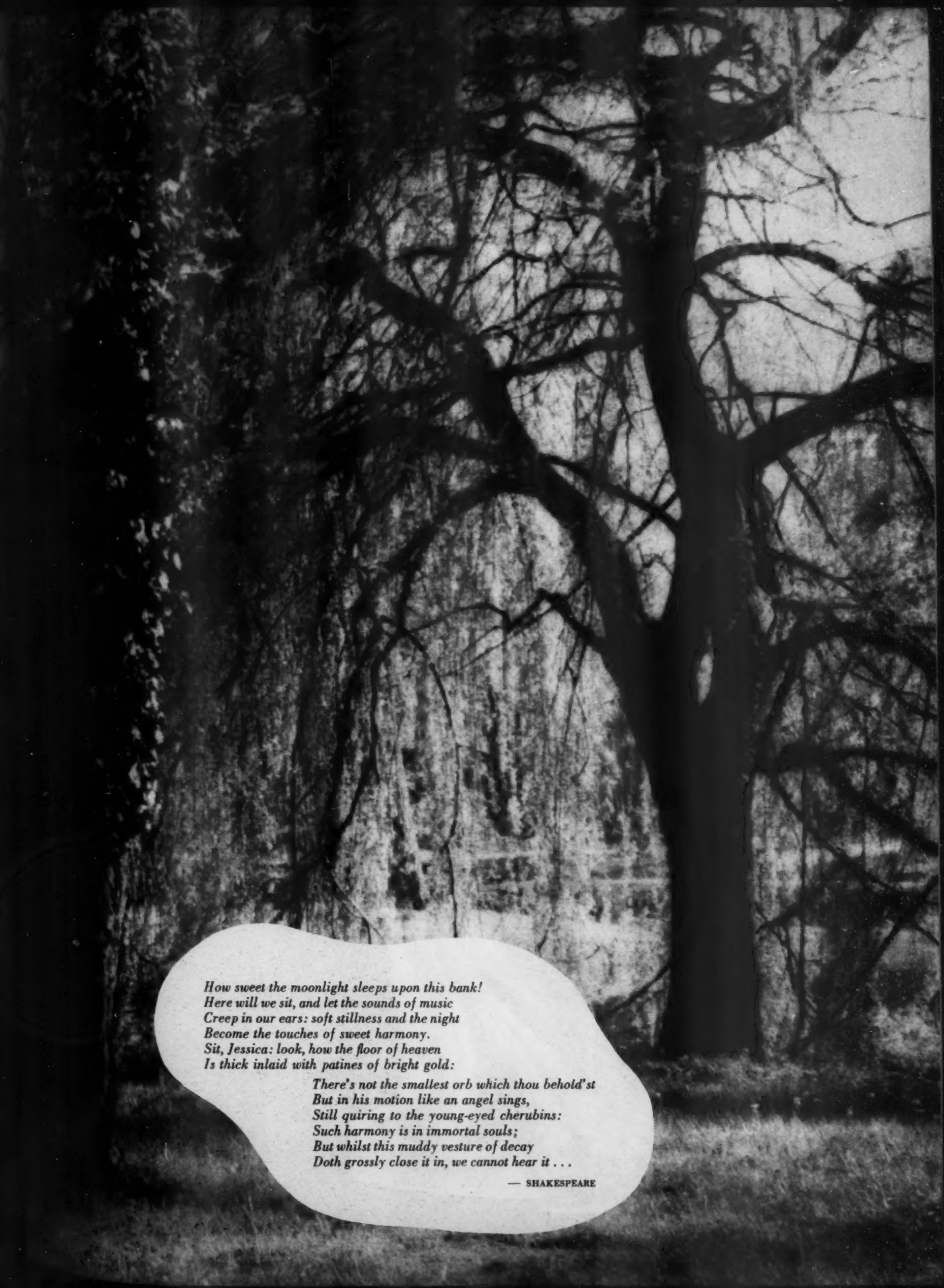
Permanent finishing of organdy is a development of Swiss chemists, whose experiments with mercerization led them to the discovery of an entirely new formula. In America, the Bellman Brook Bleachery Co. has applied this formula for starchless finish to a far wider variety of fabrics than merely the organdies for which it was originally perfected. They include muslins, lawns, voiles, dimities and other kindred constructions, of which a striking example is shown opposite.

The permanent, starchless finish protects the original characteristics of the fabric, assuring the degree of crispness that characterizes that fabric from the day of its purchase to its very last day of use. For example, if the fabric is lawn, it will remain lawn-like; if organdy, it will retain its organdy crispness. The permanent finishing, sealing down the fibers in the yarn, makes the fabric smooth, clear and strong through countless washings, without the necessity of starching it.

This starchless finish with its characteristics of permanence, clearness, cleanness in use, moisture-resistance and increased life has placed a new value on cotton fabrics and fashion merchandise of all kinds, including dresses and blouses. And in the highly competitive times before us it will be of even more importance to manufacturing and retail circles.

XUM

XUM



How sweet the moonlight sleeps upon this bank!
Here will we sit, and let the sounds of music
Creep in our ears: soft stillness and the night
Become the touches of sweet harmony.
Sit, Jessica: look, how the floor of heaven
Is thick inlaid with patines of bright gold:

There's not the smallest orb which thou behold'st
But in his motion like an angel sings,
Still quiring to the young-eyed cherubins:
Such harmony is in immortal souls;
But whilst this muddy vesture of decay
Doth grossly close it in, we cannot hear it . . .

— SHAKESPEARE

XUM

Things Visible

and Invisible

XUM

You say that you cannot see the kingdom of goodness and truth on earth. Neither have I seen it: nor is it possible for any one to see it who looks upon this life as the sum and end of all. On the earth, that is to say on this earth (Pierre pointed to the fields), there is no truth; all is falsehood and evil. But in the universe, in the whole universe, truth has its kingdom; and we who are now children of the earth are none the less children of the universe. Do not I feel in my soul that I am actually a member of this vast harmonious whole? Do not I feel that in this countless assemblage of beings, wherein the Divinity, the First Cause — or however you may term it — is manifested, I make one link, one step between the lower beings and the higher? If I see, and clearly see, the ladder leading from plant to man, then why must I suppose that it breaks off at me, and does not lead on further and beyond? I feel not only that I cannot utterly perish, since nothing in the universe is annihilated, but that I always shall be and always was. I feel that besides me are spirits that live above me, and that in this universe there is truth.

* * *

Yes, that is Herder's doctrine, said Prince André; but it is not that, my friend, that will convince me; life and death — they are what convince a man. The sort of thing that convinces a man is when he sees a being dear to him, with whose life he has been intimately bound up, to whom he has done a wrong and has wished to make atonement (Prince André's voice trembled and he turned away), and suddenly this being suffers, is tortured and ceases to be. Why? It cannot be there is no answer. And I believe that there is one. That is what convinces a man. That is what has convinced me, said Prince André.

Why, certainly, that is it, said Pierre: is not that just what I was saying?

No. I only say that it is not arguments that convince one of the necessity of a future life, but the fact that one has been going through life in fond companionship with another, and suddenly that dear one vanishes there, into the nowhere; and you yourself are left on the brink of the chasm looking down into it. And I have looked.

Well, and what then? You have known a There and a Someone. The There is the future life; the Someone is God.

Prince André did not reply. The carriage and horses had been led out on to the further bank, and were already harnessed, the sun was half sunken beneath the horizon, and the evening frost was beginning to incrust the little pools on the shore with starry crystals, while Pierre and André, to the astonishment of the servants, coachmen and ferrymen, still stood in the boat talking.

* * *

If God and the future life exist, then truth and virtue exist; and man's highest happiness consists in striving for their attainment. One must live, said Pierre, one must love, one must believe that we live not merely now on this patch of earth, but that we have lived and shall live eternally there in the universe. He pointed to the sky.

Prince André stood leaning on the rail of the ferryboat listening to Pierre. He never moved his eyes, but gazed at the red reflection of the sun in the dark blue flood. Pierre ceased speaking. All was silent. The ferryboat lay drifted at the bank, and only the ripples of the current could be heard lapping quietly against its sides. Prince André fancied that this patter of the water babbled a refrain to Pierre's words . . . *That is sooth, accept it; that is sooth, accept it.*

— FROM THE WRITINGS OF COUNT TOLSTOY

Work and Recreation

PYTHAGORAS · CHARTRES CATHEDRAL

The key to the state of humanity is that there is no balance between man and the natural forces which surround him which at their most passive infinitely outweigh him. There is only balance in that action by which man, through work, recreates his own life.

Man's greatness is in continually creating his life afresh, recreating what is given him, forging what he suffers. By work he brings about his natural existence, by science he recreates the universe in symbols, by art he rebuilds the union between body and soul. And how poor, empty and vain each of these things is apart from the rest.

Plato even was but a harbinger. The Greeks knew about art and sport, but not about work. The master is the slave's slave, for the slave makes the master.

* * *

Why has no peasant mystic written about the habit of disgust with manual work? Disgust so usual, so ominous, from which the soul flees, tries to hide, and plays dumb. This disgust it is which makes time drag. To be aware of it but not to yield is to transcend it, for disgust in every form is a most precious misery given to man as a rung on which to ascend.

* * *

Monotony is either exquisite or hideous — exquisite when it reflects eternity and hideous if it betrays an endless sameness. . . time lost, sterilized. The circle symbolizes exquisite, the pendulum hideous monotony.

A restless squirrel caged in heaven's spinning dome. . .utter misery and absolute splendor. When a man sees himself as a squirrel in a cage, without self-deception, he is near salvation.

* * *

Work reveals a disturbing phenomenon, infinity rebounding like a ball: working to eat, eating to work. Look upon either as an end, separately, and you are lost. It is the complete cycle which contains the truth.

The great misery of manual work is that simply to exist one must work such long hours. The slave has as his weary goal mere existence. He must either be detached or fall to vegetable level.

No worldly values separate the worker from God; he is unique in that. In every other state there are aims which separate man from pure good. For the worker no such separation exists; there is nothing to lay aside.

The struggle to maintain existence, not for some good object but from necessity. . . to be driven, not drawn. . . is always slavery. The slavery of manual workers in this sense is basic.

* * *

The workers need poetry more than bread. . . the poetry of life and the light of eternity. Slavery is work barren of poetry, lacking religion, unlit by eternity. For the light of eternity does not rationalize life and work, but gives them a fullness which makes rationalizing unnecessary.

Without this richness, the only motives are constraint — oppression of the people; and gain — their corruption.

* * *

Manual work is the incarnation of time. To work is to become worn out, subject to time, like matter. Work is like death; one has to die; man has to experience the weight of the world, be slain. With the universe at his back, is it strange that man is ill at ease?

FROM THE NOTEBOOKS OF SIMONE WEIL

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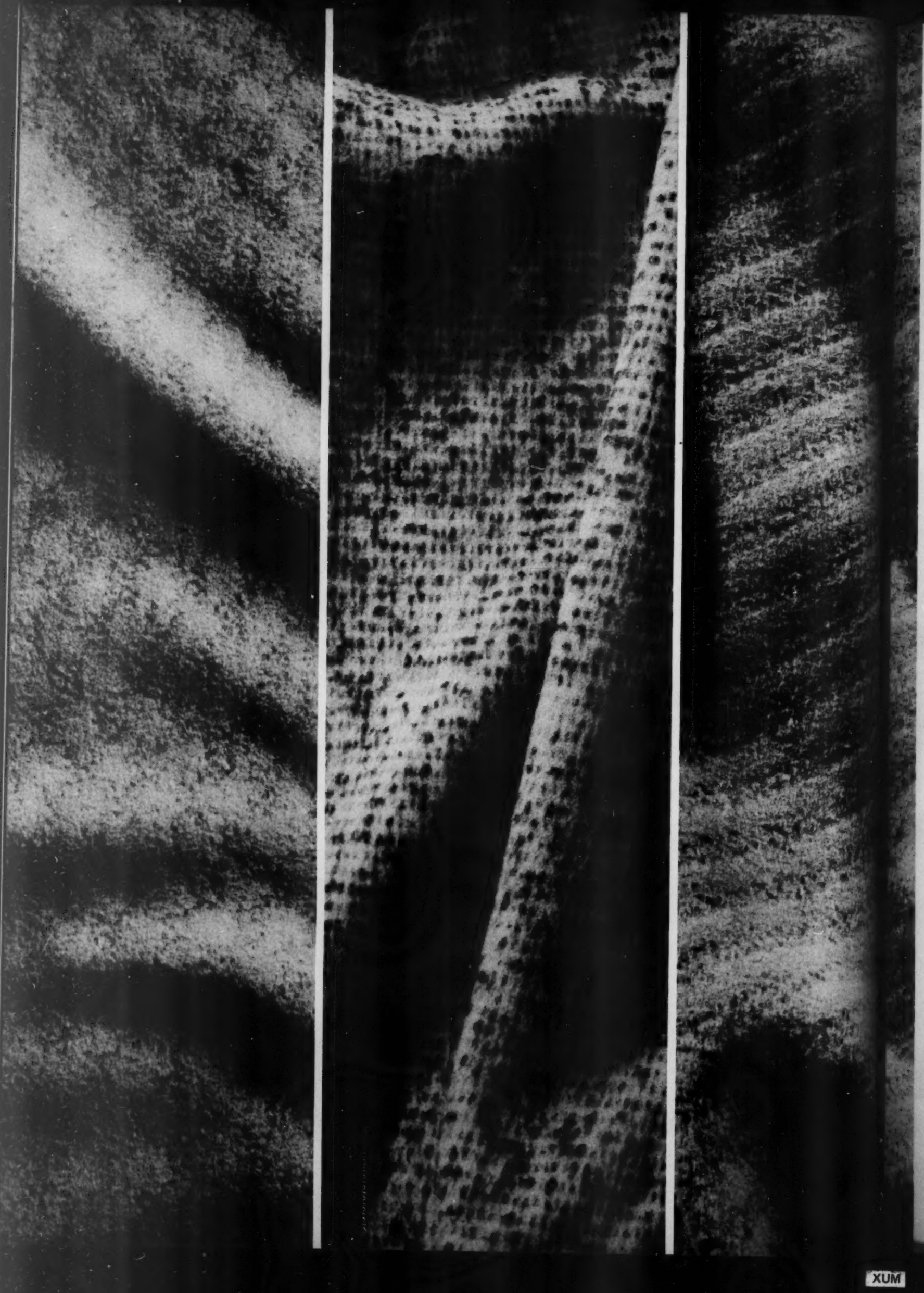


FASHION FABRICS MUST ANTICIPATE FASHION NEEDS

An interesting example of how a new fabric is conceived and designed to make a timely appearance for next season's fashions.

EXPERIENCED DESIGNERS know the importance of being alive to changes, of anticipating the needs of a fashion-sensitive public. Even at the height of acceptance of a particular fabric, certain mills recognize the inevitable law of diminishing popularity and make efforts to anticipate the future by creating new fabrics to slip into the place occupied by the old favorites.

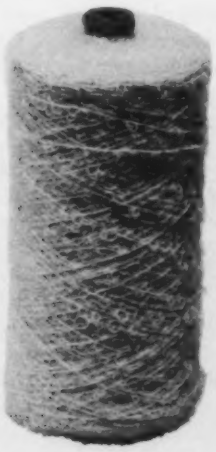
A case in point is poodle cloth. What fashion fabric will succeed the universally accepted poodle cloth in the field of fine coatings?

Poodle suggested a whole new field of design interpretation because it had, to a marked degree, the important characteristics of visual effectiveness and textural hand. The soft, dense pile suggested fur, but it had the particular pliancy and hand found only in the best wool cloths. The entire fashion industry was unanimous in agreeing that poodle cloth answered a major desire in recent seasons for something new, something good, something right to interpret the desired fashion silhouette.

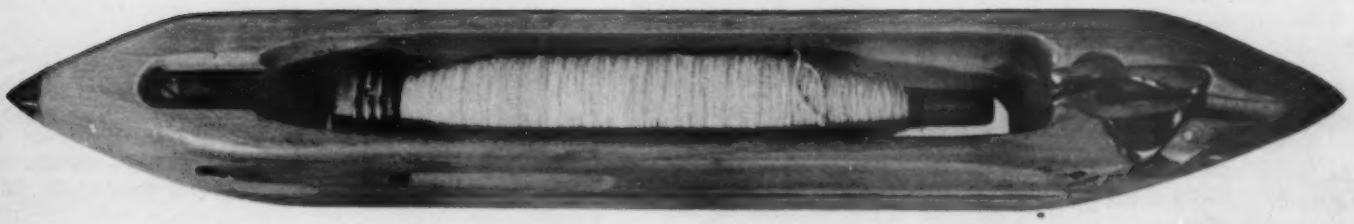
With vision ahead to next season's requirements, fashion-aware and creative firms spare no effort or experimentation in arriving at a type of fabric that will satisfy the consumer via the apparel industry.

A striking example is a new series of coatings which Anglo Fabrics has just introduced and which takes a bold step toward a wide consumer acceptance. These new coatings are based not only on the appeal of poodle cloth, but on the qualities of duvetyn, zibeline and broadcloth as well. Combining the texture and loop of poodle with the brilliance of zibeline, the brushed, soft handle of duvetyn, and the dressy quality of broadcloth, the final result is a hand that suggests cashmere in its brushed finish, but which retains the loop effect of poodle. This is achieved while maintaining the necessary qualities of sturdiness and durability, as well as fashion adaptability for all-purpose coatings. Draped styles and fur trimmings for dress occasions, tailored, casual and sports versions — all are within the promise of these unusual textures.

Several of the nation's leading coat designers who have seen the *Perlustra* fabrics, as Anglo calls them, have expressed unusual satisfaction with these new coatings. They see them not only as functionally correct for the varied fashion interpretations emanating from the consumer's expressed taste in coat fashions, but as the possible answer to the question, "What will succeed those popular poodles?"



Perlustra, the looped, smooth-finished coating of 100% wool by ANGLO FABRICS.



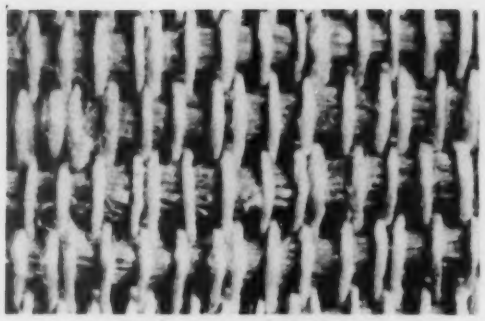


Fig. 1. Fabric woven with cotton warp and weft of unspun, undegummed ramie.

HAND-WEAVING EXPERIMENTS with RAMIE

A hand-weaving enthusiast, after reading of the development of ramie in Issue No. 14, was inspired to attempt on her own hand loom a series of experiments with this age-old vegetable fiber.

THE HAND WEAVER can frequently test a yarn or the fibers from which it is made, or explore an idea for their use or application, which may possibly in turn prove valuable to industry. It was with this in mind that the experimental weaving with ramie described in the following account was set up.

An article in an earlier issue of AMERICAN FABRICS concerning the development of the ramie industry in this country resulted in focussing attention upon this ancient fiber which, used successfully for centuries in hand-weaving in China, continues to furnish stumbling blocks in commercial captivity. The article referred to was justly entitled *The Story of Ramie, Champion Obstacle Hurdler*.

Ramie, the strongest of all known natural fibers, has remained elusive, has preferred to tantalize and to lure men of industry into many pitfalls. Like a changeling in their hands, its unspun strength reveals a brittleness like glass which is manifest when mechanically spun and woven into fabrics. On the other hand, the natural gloss and beauty of ramie has been indisputable. As long ago as the 16th century Queen Elizabeth was presented with a dress woven of single ramie fibers tied together by hand, the entire garment so light, so fine that it could be pulled through a finger ring. Elizabeth was so excited by this new China Grass that she sent forth an expedition to bring back more ramie. From that time onward, speculations over the gold to be derived from the development of ramie production resulted in ventures into the Orient, an aroused interest in Europe, and experiments in planting and cultivation in Mexico. Such ventures are known to have leveled many a fortune and on numerous occasions caused feuds and fighting over secret formulas for the decortication of the bast fiber. Repeated efforts and resultant failures to conquer this nettle weed and to turn it into commercial uses are a matter of recorded history. The Lorelei of the fiber world is the center of renewed effort to overcome its limitations of natural brittleness when spun, and yet to preserve its inherent strength and glossy qualities. Ramie is now being grown with success in Florida, and harvesting and decortication machines have been perfected. This time ramie is in industry to stay!

* * *

The desire to harness ramie upon a loom was the impetus for the following experiments. The purpose was a serious attempt to preserve all the advantages of the natural fiber while simultaneously seeking a possible solution to eliminate the disadvantages.

In the first experiments the fiber was woven unspun, in the gum, partially degummed, and completely degummed. The fabric woven in the gum was either used as such or degummed after weaving in the piece fabric, depending upon the functional use to be made of the material.

The second part of the experimental weaving was devoted to the study of commercially spun ramie threads in varying combinations with other fibers . . . ramie played against ramie, mixing bleached and unbleached threads in subtle effects; ramie weft with cotton warp; ramie and wool with added interest from cross dyeing; finally wool, ramie and unspun degummed ramie fiber were woven in one large, handsome piece to complete this phase of the experiment.

All of the experiments described in Group I and Group II were conducted as tabby weave.

GROUP I — UNSPUN RAMIE

Experiment with unspun, undegummed ramie. The first experiment was made using a cotton number 80 warp and a weft of unspun, undegummed ramie. The length of the bundles varied from four to seven feet. The bundles were laid with no attempt to join the consecutive bundles, which were merely allowed to overlap at the ends. The ramie in this sample was woven with the fiber wet; whole bundles of the fiber were used, no attempt being made to split them. The fabric was then left in the gum. Other samples were woven in the same manner, but the bundles of the fiber were split into small bunches in order to produce a finer fabric. The types of fabric thus woven could be used effectively as covering for rustic furniture, window shades and table mats. Fig. 1 shows the resulting type of fabric.

Experiment with unspun, partially degummed ramie. In the second experiment a warp of fine number 60 cotton was used, the weft being unspun, partially degummed ramie. This type of ramie can be obtained from Florida-grown plants which are partially degummed in order to obtain a product comparable to a better type of *China Grass*. The natural fiber bundles of about one-half inch in thickness were split by hand into smaller bunches which were woven in the same way as above. The left side of Figure 2 shows the fabric thus obtained. The experiment was continued by final degumming after weaving of the fabric. This was done by treating the fabric for five minutes under 15-pound pressure in water to which a detergent was added. The right side of Figure 2 shows the fabric obtained in this way. Both of these fabrics are extremely handsome and could be used for suiting, upholstery, draperies, table ware and for other commercial uses.

Experiment with unspun, fully degummed ramie. In the third experiment the warp of fine cotton was again used, the weft being unspun commercially degummed ramie. This ramie was also obtained from Florida and has a silk-like, snow white, glossy appearance. These bundles were easily pulled apart,

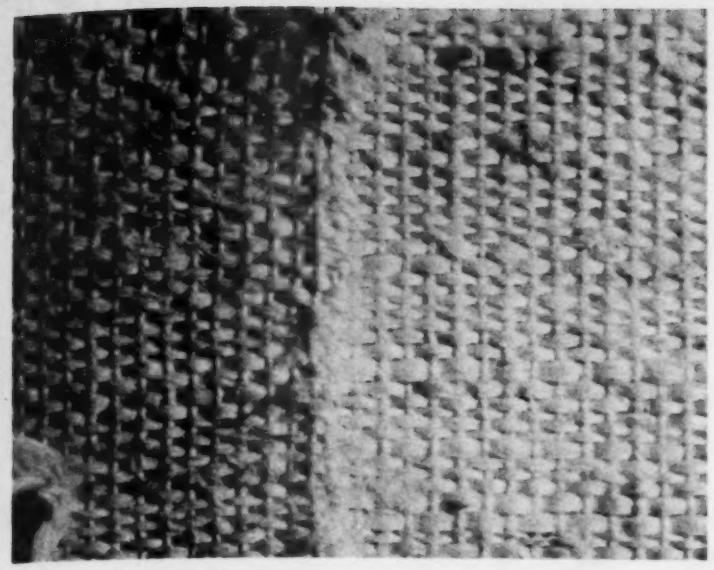


Fig. 2. Left side of photo shows sample made with unspun, partially degummed ramie in weft and cotton in warp. At right the sample is shown degummed after weaving.

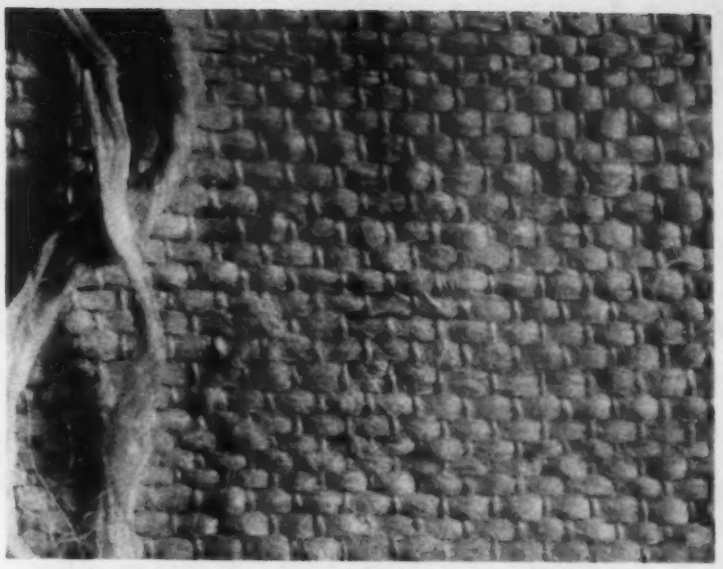


Fig. 3. Fabric of cotton warp with weft of unspun, fully degummed ramie. At left is seen a sample of the ramie fiber used in the weft.

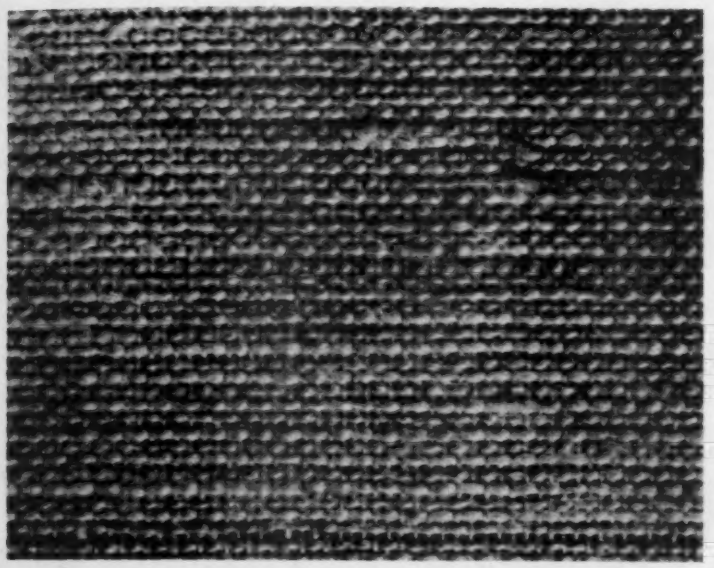


Fig. 4. Fabric sample woven of commercially spun pure ramie, showing results of different combinations of bleached and unbleached threads.

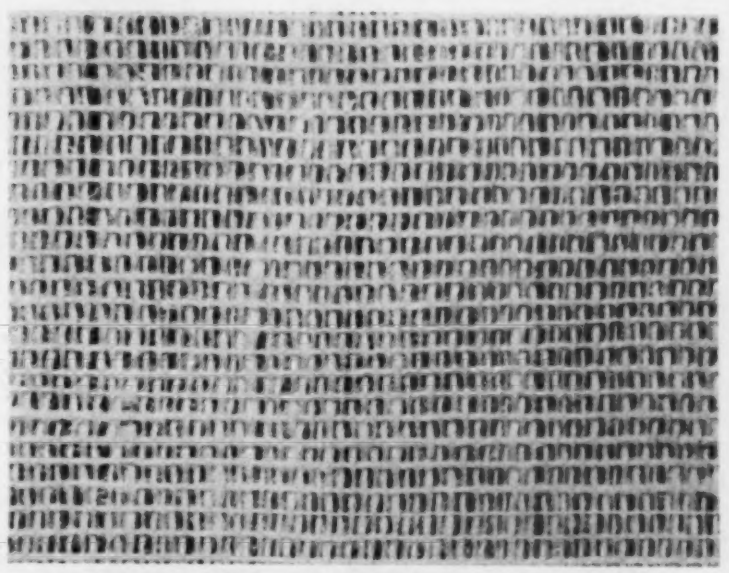


Fig. 5. Sample of mesh type of fabric achieved by loose weaving of bleached ramie threads, commercially spun, and used for both warp and weft.

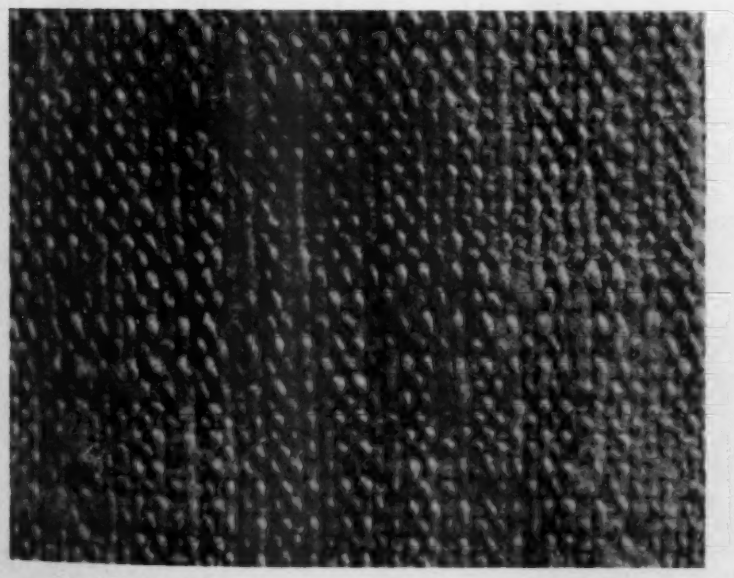


Fig. 6. Fabric woven of commercially spun ramie, both bleached and unbleached, in combination with wool yarn. The warp is of ramie and the weft of wool.

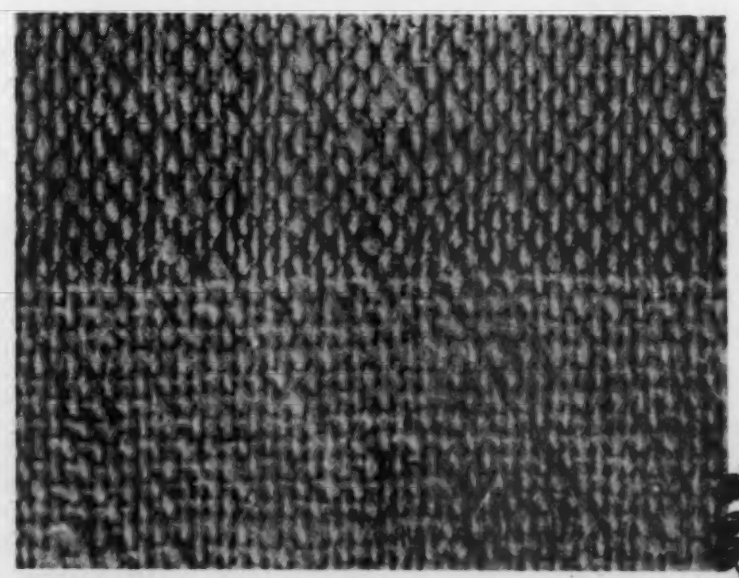


Fig. 7. Upper part of this sample is woven entirely of wool yarns. The lower section is woven with the warp of wool and the weft of ramie.

XUM

separating into small bunches of elementary fibers, and they were used in shorter lengths than the above-mentioned undegummed ramie, but the ends were allowed to overlap in the same way. Notwithstanding the shorter lengths, the material proved easily manageable in hand-weaving. Figure 3 shows the fabric obtained in this manner. The fabric is snow white with the glossiness of silk and is suitable for draperies, upholstering, and might in a finer quality also be used for suiting.

Group II — Commercially Spun Ramie

Experiments with pure ramie, combined bleached and unbleached yarns. The warp was run in three different combinations to give three different panels in the one sample. The first part of the warp was threaded by alternating two bleached and two unbleached threads; the second part of the warp was threaded by alternating one bleached and one unbleached thread; the third section was threaded by alternating three unbleached and two bleached threads. The filling was of finer ramie unbleached thread. Figure 4 shows these combinations in one fabric. The most subtle interplay of bleached and unbleached threads came into effect in part two; the greatest contrast in threads came into effect in part three. All three combinations appear very suitable for apparel, mats, and upholstering, especially when used on a flat surface where the danger of extensive creasing, which is detrimental to spun ramie yarn, is avoided.

Experiment with pure bleached ramie. The warp and weft of this fabric were prepared from the same yarn. The fabric was loosely woven in order to obtain a mesh-like quality. Figure 5 shows this fabric. The resulting material appears to be suitable for utilization in dress material and draperies. During the weaving a high degree of brittleness of this fabric made from commercial yarn was already apparent.

Experiment with commercially spun bleached and unbleached ramie combined with wool. The warp is the same as in the first experiment in Group 2 . The weft was natural creamy hand-spun wool. Figure 6 shows the resulting material, which is quite striking in appearance and suited for application in coats and suits.

Experiment of commercially spun ramie combined with wool, attaining cross dye effect. In this experiment the warp was wool and the weft ramie. The fabric was dyed with a vegetable dye after weaving, resulting in the dyeing of the ramie but not of the wool, thus giving a subtle two-tone effect in the finished material. Figure 7, lower part, shows this material in comparison with a comparable all-wool fabric woven and dyed at the same time, shown in the upper part of the same photograph. This material would be highly suitable for suits, ties, throws and other wearing apparel.

Experiment with unbleached commercially spun ramie combined with wool and shots of unspun degummed ramie. In this experiment the fabric was woven in the same manner as that described in the preceding experiment with the one difference that *hit and miss* shots of glossy, unspun and degummed ramie in varying lengths were scattered at irregular intervals along with the weft. This material is outstanding for quality and *good looks* when used as a sport coat, topcoat or suit for men or women. Upholstery and drapery from this fabric could be most distinctive. Cross dyeing might add even more interest, the completely degummed, unspun bits taking on electrically brilliant coloring, played against the more subtle dyed and unbleached ramie thread, and the vegetable dye-resistant wool.

* * *

As a result of the foregoing experiments it is believed that ramie has been shown to be very adaptable to successful use in hand-weaving. The fiber can be effectively applied here in the unspun, undegummed state, in the unspun, partially degummed state, and in the unspun, completely degummed state, resulting in a strong fabric with character suitable for draperies, upholstery, suiting, table ware and other articles which require fabrics resistant to mildew and microbiological disintegration. Because of the long, smooth fiber, ramie cloth is not readily soiled and washes easily since it absorbs water quickly and dries rapidly.

The experiments aso revealed that ramie can be effectively degummed in the piece after weaving. The advantage is that the gum holds the fine fibers together, and thus they can be more easily controlled if woven in the gum, wet; and splitting the bundles of fiber to the desired thickness while wet is more facile.

The completely commercially degummed, unspun ramie is less easily separated but can be woven in the thickness in which the fiber bundles appear, or split with a needle as desired, resulting in a fabric of glossy white beauty.

Weaving with commercially spun ramie thread in various combinations and blended with other yarns, such as wool and cotton, proved that ramie plays a unique role in producing fabrics of striking individuality. The ramie thread, when used as a warp, may tend to break frequently, but can be used successfully provided the worker exercises extreme patience. More practical, however, is the use of ramie as a filler.

The above experiments may have importance for industrial application insofar as the principles suggested may be adapted to industrial weaving of handsome, durable fabrics. The advantages of this new use of unspun ramie, here suggested, are that both the strength and the high gloss of the fiber can be brought to their greatest expression, while the undesirable qualities of ramie, which inevitably develop when the fiber is commercially spun into yarn, do not manifest themselves so readily.

— Frances Forbes Ison

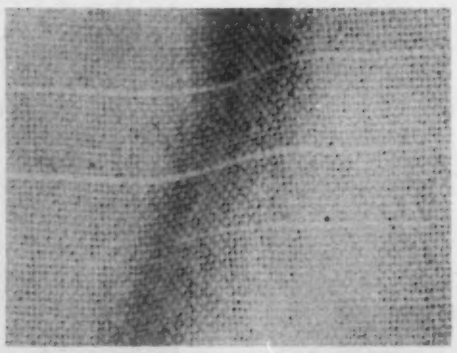
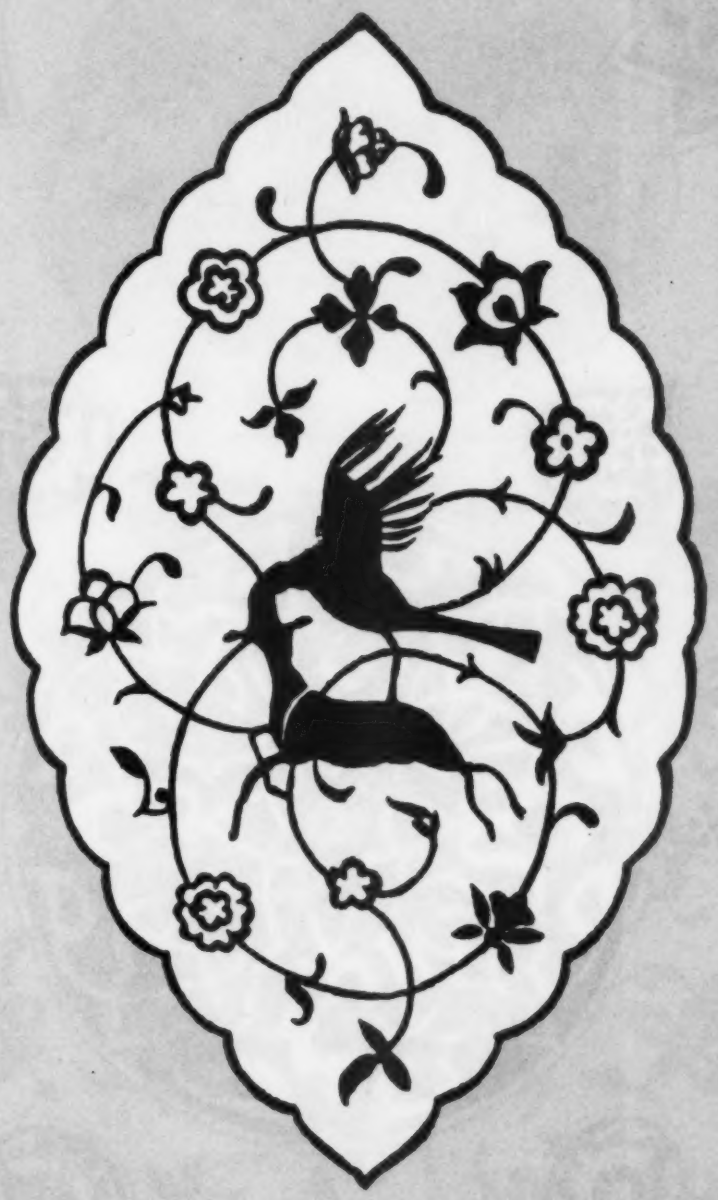


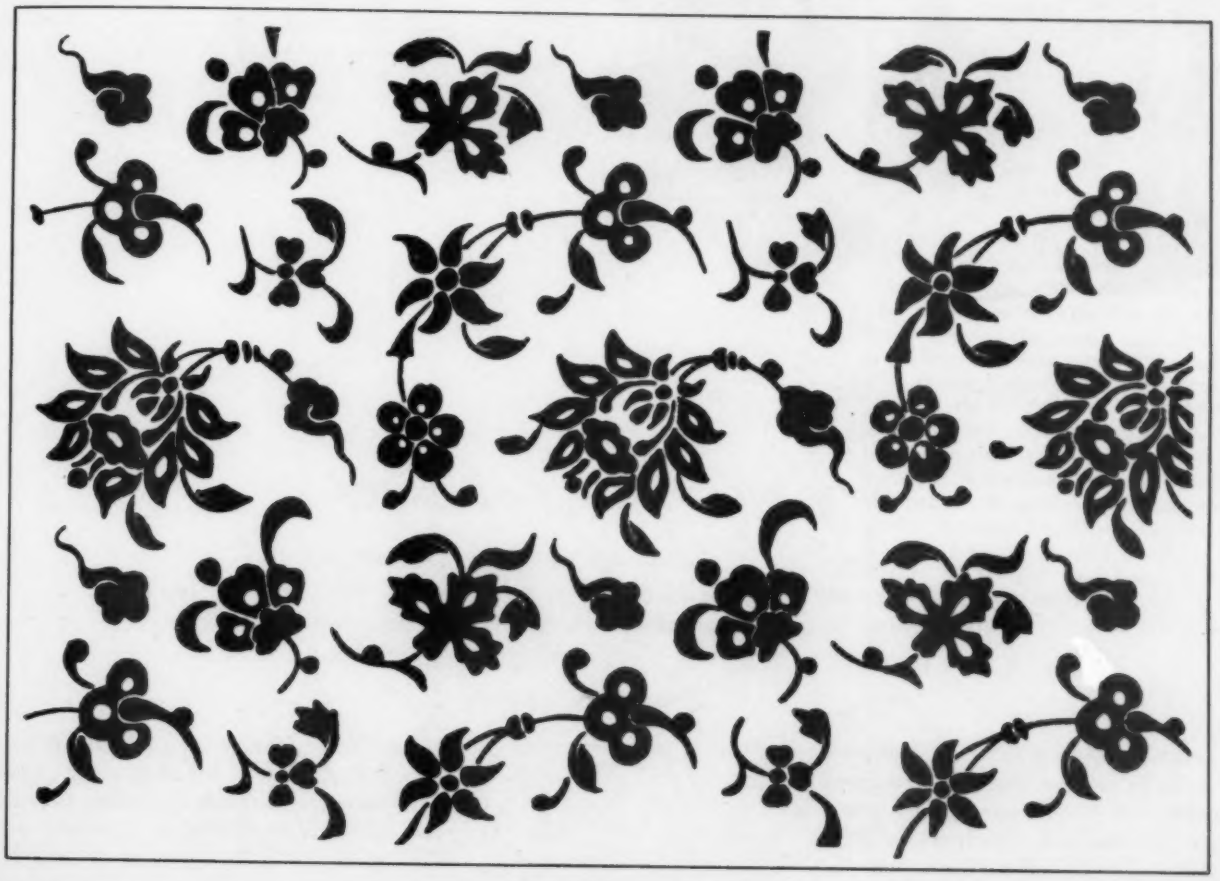
Fig. 8. Fabric woven of natural wool yarns in warp, with weft of unbleached commercially spun ramie thread, and shot with unspun, degummed ramie fiber.

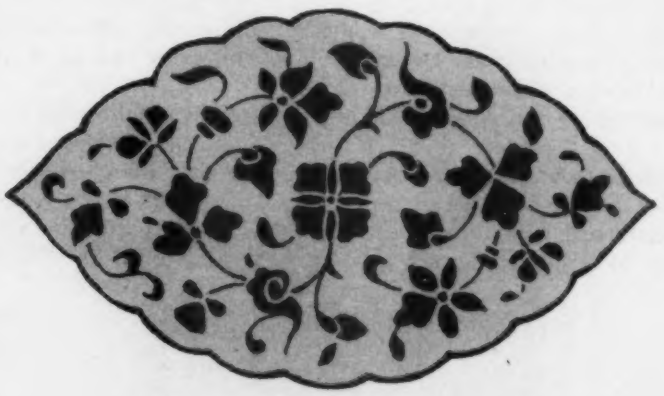


TURKISH DESIGNS

Selected examples of the immaculate craftsmanship which, working within strict rules of decoration, evolved the medieval Turkish style of design.

Geometric designs from the doors and windows of the Mausoleum of Mustafa and Cem, sons of Mohammed the Conqueror, built in 1474





Solar decorations from Fifteenth Century book covers in the private library of Mohammed the Conqueror

The Cinderella Story Unfolds to Show . . .

NEW DIRECTIONS for FABRICS

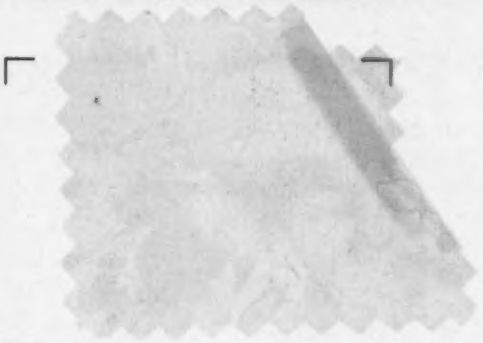
In Everglaze fabrics the variety of effects, the varying and appealing characteristics of a soft or crisp finish, of a high or low luster, of the type or construction of the cloth . . . these are limited only by the vision of the textile designer or producer.

ORIGINALLY EVERGLAZE FABRIC developments were confined in the main to cottons, and this development constitutes a great contribution, perhaps the greatest modern research has given, to this fiber's usefulness and worth. Each day new applications in these cottons for apparel and decorative use demonstrates this fact. But now, the field of fabrics thus treated, because it provides a certain luxury at low cost and gives the basic cloth added desirable qualities, has broadened to include rayons, acetate fabrics, nylon and other man-made fibers, as well as some of the new blends and fiber or yarn combinations.

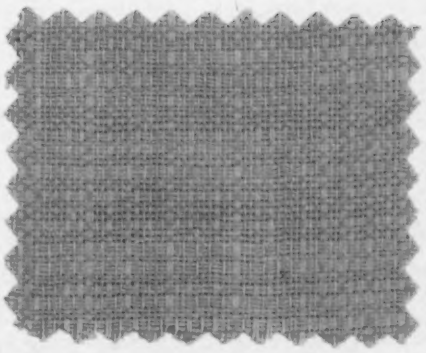
The production of fabrics by this development is achieved by patented methods that combine the impregnation of the cloth by special resins with heat, and with or without mechanical pressure, either prior to or during the setting of the resin on the fabric. The result achieved enhances the valuable properties introduced by resin impregnation. It gives a durable freshness of finish . . . with patterned, textured or embossed surface effects; with lasting wrinkle-, shrink-, stretch-, spot-, soil- and mildew-resistance. It offers a controlled porosity. It also gives the manufacturer a greater ease of cutting, sewing and tailoring, and the consumer better absorption and quick drying qualities.

On the opposite page are shown some of the latest Everglaze fabrics. Here are developments which open up new possibilities for the designer to work with summer sheers and round-the-year cottons. These and other new fabrics have sales value for the manufacturer of formal or leisure wear because of their lasting freshness and eye appeal.

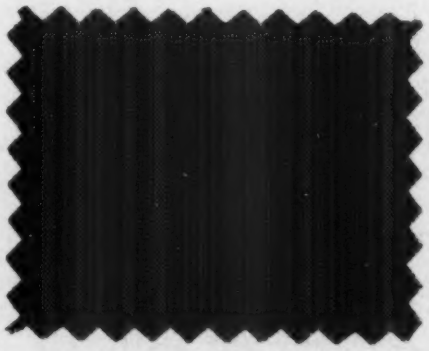
Everglaze acetate taffetas, presented for the first time by EDWARD GOTTESMAN, INC. Outstanding properties of these brand new acetate taffetas are: lasting freshness and wrinkle-resistance; durability of luster and of the patterned and textured effects through dry cleaning and ironing; shrink-, stretch-, spot- and soil-resistance.



Everglaze 100% nylon sheers, styled and offered for the first time by FORGE MILLS. These Everglaze 100% nylon woven sheer fabrics are distinguished because they possess appealing texture and surface effects, durable to washing, dry cleaning and ironing. In addition, they are pleasant to the touch and provide improved wearing comfort due to the fact that in woven nylon fabrics thus processed the entrainment of moisture is substantially reduced.

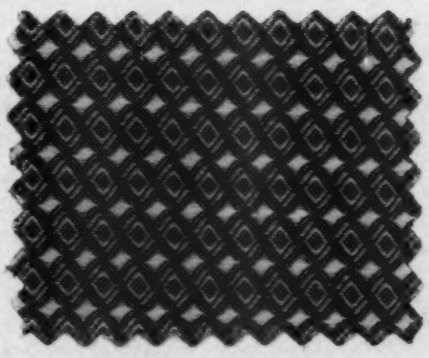


Everglaze straw-like cotton fabric, an unusual porous cotton rustic cloth styled by U. S. FABRICS, INC. It is available in white and navy as well as in natural straw color. Originally created for men's caps, but because of its attractive texture and combination of washable Everglaze properties, it is being used for many different and widely diversified purposes. These include: men's sportswear and play shoes, swim trunks, skirts, separates, housecoats, millinery, place mats, bedspreads, draperies, wall coverings, lamp shades, summer furniture, handbags, belts, airplane luggage, straw hat bands and other articles of apparel and home furnishings.



Everglaze cotton suitings for year-round wear newly presented by J. P. STEVENS & CO., INC. Available in a wide selection of woven tweeds, nubby surface effects, worsted types, basket weaves and sharkskins in a full color range. These cottons possess desirable properties; they are comfortable to wear, lasting in wrinkle-resistance; exceptional in spot- and soil-resistance; they retain good looks, hand and freshness for the full life of the fabric, enduring through washing or dry cleaning and ironing.

These new cotton suitings are finding ready acceptance in suits and two piece dresses for women and in sportswear for men, because they combine comfort, good looks, practicality and economy and are not restricted to seasonal wear.



THE CONSUMER

The millman, the converter, the apparel manufacturer, the retailer, the retail clerk . . . all constantly use textile words and phrases as selling blandishment . . . all assuming that Mrs. Consumer knows what they're talking about. Sadly enough, a good deal of it is incomprehensible to her. And so writer Cora Carlyle gathers a

Q. What is meant by Pima cotton seen so much in advertising men's shirts?

A. It is a fine quality cotton raised in irrigated areas in the western states and takes its name from Pima County, in the southern part of Arizona. It was developed as a result of crossing American and Egyptian cotton seeds about 140 years ago. Light tan in color, silken in feel and of excellent working properties, it has an average staple length of 1 9/16 inches. It is being replaced at a rather rapid rate by another far western cotton known as S x P, which implies that the Pima has been crossed with Sakellaridis, the original Egyptian cotton whose seeds were brought to Arizona for experimentation with the native seeds.

Pima has about the best working properties of any American cotton for shirting, tire fabric and specialty fabrics. In shirting the use of Pima cotton makes very high textures possible since the fiber is extremely fine as cotton fiber diameters range; high twist may be given the yarn and the great natural strength of the cotton affords the wearer excellent service.

Q. Why are printed fabrics which are hand-screened, screen-printed or hand-printed considered more desirable than fabrics which have been colored by the ordinary roller methods of printing?

A. One always pays more for work done by hand than by machine, as in the case of hand-woven fabrics, hand-made shoes or hand-made laces. Screen prints seem to have a greater depth of color and brilliance, as well as a three-dimensional effect so that the motif appears to stand out. A design of practically any size can be made for screen printing, thereby giving the designer a wider latitude for his creative abilities in designing and in combining his colors and achieving desired effects.

Q. While there are standards set up for wool and cotton fabrics, kindly let me know if anything of this sort has been done for rayon materials.

A. Wool and cotton standards have been set by the government; up to the present time standards for rayons have been purely voluntary. The American Standards Association, working with the National Retail Dry Goods Association, has prepared a set of proposed standards for rayon fabrics. These will give consumers and store buyers, in purchasing women's wear, men's wear and home furnishings, information as to what may be expected from the end-use of the goods in question. The data would include such considerations as shrinkage, tensile strength, fastness to sunlight and gas fading, and other factors of concern.

Q. My home economics teacher has assigned me to obtain some information on *dope dyeing*. Can you inform me what this is, the method employed, etc.?

A. Dope dyeing does exist and is also known as solution-dyed or spun dyed. The term *dope* seems to have caught on in the trade very well and is perhaps more popular than its two synonomous terms. The word was used during World War I to describe cellulose acetate solution which was used to coat or cover airplane wings. Later, the word was used to describe the acetate spinning solution in the manufacture of acetate rayon yarn. The term today, with regard to dyeing, is used in the following sense: after the solution used has been prepared and filtered for purification, the proper dyes are introduced into it. This solution is then extruded through the spinnerets and dried in the usual manner. Thus, the color has become impregnated in the filament itself, by the color and fiber bonding together.

Much skill must be used by the dyer to know how much dye to use to achieve the required shade. At present, only experienced dyers can do the work to satisfaction, though the method is meeting with acclamation in the trade wherever it can be used. Dope-dyed cloths have splendid fastness to light, the solid colors are attractive and color combinations such as plaids, stripes and checks are likewise successful. The colors do not wash out in laundering. One disadvantage, however, is the fact that it is practically impossible to remove dope-dyed color should it be desirable to re-dye the goods. Consequently, it has been the general practice to dope-dye only such materials which it is certain will not need re-dyeing, such as plaid dressgoods and black or flesh color fabrics for lingerie.

Q. Under the recently promulgated Trade Practice Rules for the Rayon and the Acetate Textile Industry, is labeling to be required; if so, just what will be meant by the terms *rayon* and *acetate?*

A. First of all, goods must be labeled either *acetate* or *rayon*. Fibers made by the cellulose acetate method will be labeled *acetate*, and those made by the viscose and the cuprammonium methods will be labeled *rayon*. Formerly it was necessary to add the word *rayon* after the word *acetate*, but this is no longer required since the new ruling became effective February 11th, 1952, following a thirteen-year study of the question. The Federal Trade Commission on December 11th, 1951 decreed the change.

If you wish to obtain a copy of the Rules, write to the Federal Trade Commission, New York City or Washington, D. C.

Q. My neighbor, who is a textile worker, mentioned the other day the Redman Process that has to do with shrinkage of knit goods, I believe. Can you tell me more of it?

A. It is a process used to reduce shrinkage in knitted fabrics and is being used extensively on cotton-rib underwear fabrics. As we all know, consumers have long suffered with excess shrinkage of this type of fabric, and it was the practice of many people to buy garments one or more sizes larger than required in order to render them usable for a period of time. The Quartermaster Corps and the Underwear Institute have combined in making the process known to the retail trade.

WANTS TO KNOW...

group of typical Mrs. Consumers before each issue goes to press . . . asks them what they'd like clarified in textile terms . . . and puts the questions to Dr. George Linton, Textile Editor. Here is the latest group, and the answers may provide illuminating information for the benefit of many readers.

Q. Why does a silk or a cotton dress seem so much more comfortable to wear in hot, humid weather than one made of nylon or rayon?

A. Different fibers have their individual properties and characteristics with regard to the amount of moisture they will hold, because all fibers take up moisture when the humidity is high. Cotton and silk absorb moisture more quickly and therefore do not seem ever to feel wet or clammy.

Q. I have a suede leather coat which has become badly soiled around the collar and cuffs. Can I clean the garment with some cleaning fluid, or must it be sent to the dry cleaner?

A. Do not attempt to clean the coat yourself since there are many considerations as well as special methods necessary in cleaning suede garments. Even your dry cleaner may not be equipped to handle the garment properly. It is suggested that you consult the classified telephone directory under *Leather Cleaners*. These listed concerns have made a special study of the cleaning and re-conditioning of leather garments. They can even re-dye them to some other color if desired or necessary. It should be borne in mind that garments of this type should not be allowed to become too soiled before cleaning as this means more drastic treatment accorded the article.

Q. I have a dress printed in red with the so-called *fluorescent dye*. Can you explain why the print looks so much brighter than ordinary red?

A. Fluorescent dyes were first developed during World War II for use on aircraft carriers and by aviators who used the dyed fabric as a signal flare when in distress away from their base; many aviators were aided and saved by these brilliant cerise and orange flare signal fabrics. Signal officers wore fluorescent striped uniforms for greater visibility.

The dyes are more brilliant than ordinary dyes because they have the singular ability to reflect more light. Even in artificial light, they are brighter than other types of dyes. Incidentally, these dyes stand up very well in dry cleaning but should not be washed unless the accompanying instructions suggest washing.

Q. What is meant by a 2 x 1 shirting? I have heard several versions as to the meaning, but would like to obtain a factual definition if you are able to supply it.

A. In the warp or vertical direction in the shirting (or in any woven goods, for that matter) (two-ply) the fabric has two single yarns twisted together which act as a single yarn. Plying of yarns adds considerable strength to any fabric; the drapability of the shirting is also improved. The filling or horizontal direction of the material is of one yarn, commonly called a single-ply yarn. Warp yarn is usually stronger than filling yarn since the former withstands the greater rigors in weaving the cloth; filling yarn undergoes little or no tension since it readily comes off the nose of the bobbin which is carried to and fro through the shed of the loom by the shuttle. The 2 x 1 arrangement causes higher texture and affords a heavier and more durable fabric.

Another popular shirting fabric is a 2 x 2 construction. This means that both warp and filling are of two-ply yarn and that the fabric is even better and stronger than the 2 x 1 shirting.

Q. One of my pet gripes is the fact that I have so many holes in my good clothes caused by the staples that even the best dry cleaners use to fasten their identification tickets onto garments. Is there something that might be done about this trying matter?

A. We will pass your question on to the National Institute of Cleaning and Dyeing. This wide-awake organization sends out bulletins to all its members and we believe they will be pleased to give consideration to your complaint.

Q. I know that sweaters, blouses and lingerie made either of Dacron or Orlon need no special care in washing, but kindly tell me how to wash fabrics made of these fibers blended with other fibers.

A. Usually a hangtag will give the correct directions. If there is no tag, and the information is not forthcoming from the salesperson, the safest method is to have the garment dry cleaned. If you still wish to try washing the garment, bearing in mind the following points may be of benefit: 1. Trimming and thread should be fast to bleeding of color. 2. Delicate sheers give best results if hand-washed; use a soap or a detergent. 3. Water for both washing and rinsing should be as warm as the hands can stand. 4. Hang the garments dripping wet in order to avoid ironing, allowing them to drip-dry. Then finger-press at the hems and other edges. 5. If ironing is necessary, it can be done when the fabric is either damp or dry. Use the *rayon* setting of your iron. Higher heat may cause a shiny surface. 6. Always remove spots or stains, as on any other garment, as soon as possible by sponging with soap and water or with a safe cleaning fluid.

Q. I have a skirt, a housecoat and a bedspread, all of which are quilted. I have much trouble with the constant ripping of the quilting stitches. On the skirt, for instance, I noticed there was a small end of thread protruding when it came from the store. I took hold of it and immediately four or five inches of stitching came out, which ruined the quilted effect. Can you suggest something in this whole matter of quilting?

A. The lines of quilting stitching are practically always put in by a chainstitch machine which takes less thread and is easier to manipulate for thick fabrics; also, if the operator should make a mistake, the line can be easily and immediately pulled out. Our only suggestion is that you keep close watch for the little ends of thread which may come loose, and secure these by hand with a needle and thread as quickly as possible.

Twill gabardine all-worsted Pacifixed, approved by the American Institute of Laundering as wool washable. 10-10½ *ounces suitable for shirts and slacks.*

BY PACIFIC MILLS

WASHABILITY . . . PRIME SALES FACTOR

For thousands of years men have woven woolen fabrics; for centuries science has increased their commercial possibilities in weaving and processing; but only since the advent of washability for wool can it be said to have caught up with today's consumer needs.

UNQUESTIONABLY THE PHYSICALLY cleanest group of people in the world is the citizenry of the United States.

Cleanliness is practically a fetish with modern Americans. It is instilled into us at babyhood with daily scrubbings, tooth brushings and other ablutions. As we grow up it becomes an ingrained characteristic which influences, among other things, our choice of all intimate items, and particularly our choice of wearing apparel.

Through experience and education the average American rightly believes that nothing will clean better than soap and water. This visual certification that a garment is washable becomes a prime factor in its sale.

The importance of this insistent consumer demand has been recognized commercially. Business men ever on the alert to improve products and so build increasing sales and good will have set forth certain standards of washability which carry beyond the basic cleanliness factor. Through an educational and promotional endeavor that extends over a great many years, washability has come to imply many things. Among them are:

1. The ability of a fabric to shed dirt and soil through soap and water cleansing.
2. Shrinkage control.
3. Fastness to dye and other coloring materials.
4. Maintenance of original tensile strength.
5. Resistance to bleeding during soap and water processes.
6. Eradication of perspiration and other stains and odors.
7. Clothing hygiene . . . to the point of destroying organic elements which might lead to infection.
8. Maintenance of basic fiber characteristics.
9. Imperviousness to chemical reactions or to alkali and acid (basic constituents of soap detergents and hard water).

Most (and in some instances all) of these attributes are commonly accepted as part and parcel of any cotton fabrics labeled washable. But it has been only in recent years that fabrics made from other fibers have come from the laboratories and mills bearing these same characteristics.

Woolens Meet the Challenge

Woolen textiles are among those which have undergone this mutation. Wool has been universally accepted, from Biblical times to the present day, as one of the blessings of mankind. Its warmth, rich hand, elasticity and extreme durability have made it a prime fiber for wearing apparel. But its antipathy to cleansing processes involving soap and water has made the upkeep of woolen garments expensive, which served in some degree to limit its sales in various apparel categories. In addition to this, wool that has not been finely and expensively finished is subject to shrinkage under any conditions involving moisture, such as rainstorms. We are all too familiar with the cartoons of the chap who bought a cheap woolen suit that was too large for him, then walked out in a rainstorm; and in the next strip is shown wearing a garment that is much too small.

During times of peace we could laugh at such a contretemps. But during wartime this shrinkage problem became a serious matter. The health, comfort and general efficiency of our fighting men could very well spell the difference between defeat and victory. In the field it was necessary for reasons that are obvious to clothe our armed forces in woolen garments. The big problem that presented itself was to find a method whereby woolens, particularly those worn close to the body such as shirting woolens, could be easily and satisfactorily laundered by a soap and water process.

In 1944 Pacific Mills accepted this problem and set about solving it.

At Lawrenceville, Mass., Pacific Mills has a Research Laboratory manned by a group of fifty scientists and equipped with all modern investigating and testing paraphernalia. This is probably one of the largest research organizations designed to solve problems pertaining to woolen fabrics, to improve on their natural merits, and to extend their uses.

After months of intensive team work, both in experimenting

and testing, the research group at Lawrenceville came up with an original discovery. They found that by treating wool fibers in a special way with a basic resin (melamine formaldehyde) woolen piece goods could be subjected to countless soap and water launderings without shrinkage and without destruction of the intrinsic hand and other desirable qualities of the wool. Thus, an entire new field of product utility was opened for fabrics made from this animal fiber. But the laboratory tests in themselves were not sufficient. The process had to be tested under actual field conditions. At the end of three years, in 1946, thousands of field tests had proved that woolen fabrics processed by the Pacific Mills technique met all commercial and government non-shrinkage standards; that is, less than 2% shrinkage under normal laundering treatment. The name given to Pacific Mills' woolens made under this method was *Pacifixed*.

At the end of 1946, as military demands diminished, the process was released for commercial development, primarily in goods for shirts, slacks and robes. They hall-marked the finished products made from these goods with the Pacifixed label and set about educating the consuming public to the fact that here at last were woolen garments that could be laundered. But this is only the beginning of the success story.

Cooperation of Laundry Institute

There is a great deal of difference between home laundering and commercial laundering, as was soon discovered. In order to avoid having commercial laundries destroy all of the promotional and educational effort that had been put into producing a washable woolen, Pacific Mills' production executives realized that a further educational job had to be done. That job was to advise and inform the laundries of America of the proper methods for tubbing Pacifixed fabrics. To this end they obtained the cooperation of the American Institute of Laundering, an organization which has been in existence since 1883 and which now numbers among its members some 4500 of the 7000 laundries operating in the United States. This Institute was aware that a portion of all claims made to laundries for damages was due to the lack of information provided for the individual laundry of the reaction of new types of fabrics to different laundering processes. It was pointed out that this was particularly true in the case of the new Pacifixed wools. The Institute was quick to see the benefits to their members and set about testing and experimenting in order to obtain and supply laundering data to members of their group.

When the American Institute of Laundering had completed exhaustive laboratory and field tests, it was convinced that under normal conditions Pacifixed goods could be safely washed by a soap and water process. Several of its monthly bulletins were sent to its members showing the trade practices which could not be followed in laundering Pacifixed woolens. Other bulletins contained positive information as to the best methods of laundering the same fabrics. And, in support of its findings that Pacifixed woolens could be laundered, the American Institute of Laundering issued its seal of approval which performs a dual function: (1) it assures the consumer that here is a garment that can be tubbed; (2) it tells the cleaner that here is a garment which can be cleaned with soap and water and that a brief reference to the American Laundering booklets will show the best method of doing this.

Here is an excerpt from a typical bulletin that reached almost 5,000 cleaners and dyers throughout the country: "The American Institute of Laundering awarded the certified washable seal of approval to a 100% wool worsted fabric bearing the

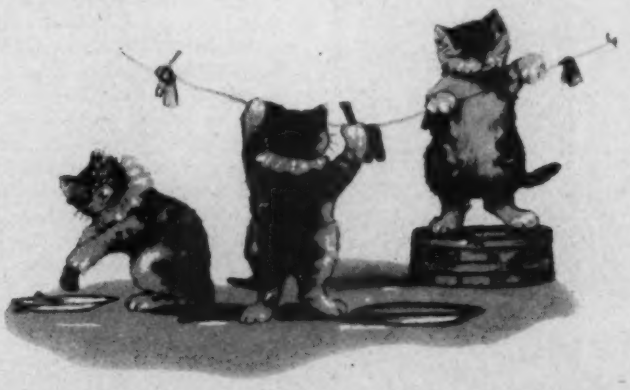
trade name Pacifixed. It is the first all-wool fabric to be certified washable by the Institute. It is now appearing in made up shirts, slacks and robes all over the country. These garments will contain a woven label marked *Pacifixed wool washable 100% wool* and bear the certified washable seal of the American Institute of Laundering. . . . The success of the wool launderability program is increasing the laundry bundle volume of the industry. It is up to the laundry owner to keep the program going at full force. The public has accepted launderable woolens and is looking to its laundries to do an adequate maintenance job . . ." Then follows a detailed series of technical instructions giving three different ways of washing and pressing woolens. Particular attention is paid to the drying and pressing so that the finished garment does not show a shine.

Training in Laundry Management

This was only the beginning of the campaign that the American Institute of Laundering conducted. The laundering of woolens was made a part of the curriculum of their School of Laundry Management which trains about thirty persons every six months for key positions in the industry. It mailed voluminous information in the form of bulletins to over 3,000 department stores and specialty shops throughout the country. It went further afield by working with converters and cutters so that the problems of dyeing, finishing, trimming, closures, etc., could all be considered in respect to soap and water cleaning. It consulted with makers of zippers, rubber fasteners and many other contributing manufacturers whose products all go into finished garments. As a result, not only the fabric itself is launderable, but now the end product bearing the Pacifixed hangtag and the American Institute's seal is 100% washable.

Such an extension of soap and water cleaning led to the development of an ever widening variety of launderable garments for men, women and children. In the men's field a new stimulus has been given to the sale of casual shirts, western shirts, robes, slacks, golfing jackets, swim trunks and military shirts and slacks. In women's apparel slacks, shorts and pedal pushers have received equal sales impetus.

In the six years that have elapsed between the perfection of the Pacifixed process and the present report, the American consumer of wearing apparel has slowly but surely come to accept the Pacifixed label with the same equanimity as sanforizing of cottons is demanded and accepted.



letters to the editor

HISTORICAL NOTES ON PINE MOTIF

To the Editors:

I have just read the letters page of your issue number 19 for Fall 1951 and am most intrigued to find someone else interested in the origins of the famous pine motif.

My family for a long time controlled the largest band block and silk printing works in this country and I myself am actively engaged in the weaving section of what is now an amalgamation of this old craft industry with a weaving plant which has supplied much of the grey cloth to the printers. I have therefore seen many thousands of yards of Persians or Paisleys come off the production line and we have a complete library of records of these styles as used for ties, scarves, gowns, mufflers, handkerchiefs, etc.

I have always found that the authorities, such as they are, refer the pine motif to Persian or maybe Chaldean times . . . at any rate to the Near East . . . but no one has ever produced what I would consider a satisfactory answer to what the motif represents or of what it is a symbol.

Clearly, it is not just a convenient decorative motif; if it were it could not have survived so many centuries nor have remained popular in so many different countries.

It *must* have an appeal . . . mainly no doubt a sub-conscious one . . . to something deeper, something which goes to the root of racial characteristics and origins.

I have heard my father assert that the motif originated in the earliest attempts to *print* cloth by putting the base of the thumb into crude vegetable color and so stamping it on to the fabric. I have heard others say it was a primitive religious symbol based on the cypress tree bending in the wind (tree worship). Others relate it simply to the familiar pine cone.

None of these solutions has ever satisfied me and the nearest I have so far got to an answer was when I came across a book on the Art Industry of Siam. Artistic work in that country is highly developed although rather stereotyped, owing to the relative political and geographical isolation of that country. Art there today is little different in method and style from what it was 1500 years ago and it was most interesting to me to find that all the pictures of the early Buddhist deities showed them with a nimbus or halo in the shape of a cone with a rounded base. This cone motif was not used separately in decorative arrangements as far as I could discover in Siamese art.

Now, this all seems a direct connection with your Monad theory. The Christian halo represents pure light, suggesting spiritual development and connection with God or Primordial Spirit. The halo of the Siamese deities similarly indicates spiritual powers. When we consider that the peculiar development of Siamese Buddhism also led to the constant use in decoration of the delicate three-pointed petals of the rice blossom drawn, usually, to represent leaping flames, it seems to me that the most likely origin of the pine motif is as a fire symbol directly connected with religious rites in which fire is symbolic of Spirit.

This would readily explain its appeal to Persian artists influenced by Zoroastrianism and to its never failing appeal today in those countries where the people are basically or largely of Indo-European (Aryan) origins.

It is interesting that this motif is rarely if ever seen in Slavic or Moorish or Scandinavian ornament or in the decorative work or artistic examples of races in the more tropical regions.

This is, of course, largely surmise and from someone who makes no pretentions to be an expert, but it would be most interesting to hear whether there are definite theories on this subject not disclosed within the limits of your interesting letter to the Editor. I enclose two photo copies of Siamese decoration.

P. W.
Macclesfield
England

Editors' Note: The two photographs referred to above are reproduced on page 58 of this issue. Here shown also is a close-up of the flame motif which has played such an important part in Eastern and Near Eastern decorative arts.

DOCUMENTATION ON VAN GOGH

To the Editors:

Composing a large documentation about the painter Vincent van Gogh, I have been looking for unknown studies in the private library of my friend, the engineer V. W. van Gogh at Laren, and have seen your issue number eleven of autumn 1949. Because this documentation ought to be as complete as possible, I hope that you may furnish me with a copy of your feature story.

Perhaps I shall write some commentary about it in one of my books on Van Gogh and in such case will certainly send you a copy.

Dr. M. E. Tralbaut
Den Heyaert
Viersel, Belgium

DESIGN SERVICE FOR INDUSTRY

To the Editors:

May we congratulate you on the Winter issue of your magazine. It is a most attractive and informative issue. We of the Institute were particularly interested in the article entitled *Modern Printed Fabrics* by Alvin Lustig. Part of our service to the manufacturers we are associated with is keeping them up to date on trends and developments in the home furnishings field. I cannot think of any better way of presenting the printed fabric picture than making this article available to them.

John H. Greene
Institute of Contemporary Art
Boston, Mass.

WELCOME APPRECIATION

To the Editors:

The English language doesn't include words flattering enough to describe your current issue. Your magazine always is a collector's item and this issue is as outstanding as any you have ever done.

Harold Schnurer
Carolyn Schnurer Inc.
New York City

USES A. F. FOR SOURCE MATERIAL

To the Editors:

There is no source from which I gather so much excellent information as from AMERICAN FABRICS. I use it in fashion design, in textile study, in sources of modern art, in weaving. It is an amazing storehouse of knowledge. I have been using the library copies but do not want to depend on those; I want the numbers in my own home so that I can enjoy them hourly and have therefore just recently placed my order thru our college bookstore. I sincerely hope that I will be allowed a subscription . . . I wish I could have all that have ever been printed. We need more such material.

Lucia Mysch
Ball State Teachers College
Muncie, Indiana

COLOR FOR TANNERIES

To the Editors:

I have been very much interested in some of the suggestions made in a recent article by Howard Ketcham. Would it be possible to reprint excerpts of this in a shoe trade paper? Color requirements for shoe factories and tanneries are similar to those outlined in the article, which would be particularly applicable to material I am gathering together.

Let me take this occasion to compliment you on all of the interesting articles on color in AMERICAN FABRICS. They are very stimulating. My young daughter copied down many of the notes on historic color in her school work, to be used in a talk on color which she gave in her public speaking course. I was interested to see at the head of her notes: "This talk is based on articles by Howard Ketcham, a color engineer." I thought this might amuse you.

Ruth H. Kerr Fries
Tanners' Council of America

A CONSUMER SPEAKS

To the Editors:

In the fabric department of one of our large department stores I saw a copy of AMERICAN FABRICS and perused it with great interest, especially as I had never seen it before. I wonder why this magazine is not available to the consumer inasmuch as there are so many women like myself who sew and who are interested in fabrics.

I take the liberty of writing to ask this: Why are there so many more interesting patterns in dress fabrics than there are in home furnishing types? For example, I cannot get the kind of corduroy in the upholstery department that is so stunning for couch covers. When I ask for this in the upholstery department the sales personnel appears to think that I have asked for something extraordinary. I have used corduroys for such purposes even though I am handicapped by the narrower width. When I see an unusual print in a dress fabric that would go well in my bathroom I make a curtain of it.

Your magazine strikes me as the kind of courageous publication that might take up the cudgels for a lone voice in the wilderness . . . or perhaps I am not alone in asking for better merchandising of fabrics.

Emma Henderson
New York City

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